Participation in Alternative Health Plans

The Role of Financial Incentives in Medicare Beneficiaries' Decisions

M. Susan Marquis, Jeannette A. Rogowski

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PREFACE

Medicare beneficiaries must make a trade-off between free choice of providers and financial incentives in deciding to join an alternative health plan rather than using the traditional fee-for-service delivery system. This study examines the trade-off empirically using survey data in which respondents stated a preference between hypothetical AHPs and Medicare.

The project was performed within the RAND/UCLA/Harvard Center for Health Care Financing Policy Research, which is supported by a cooperative agreement between the Center and the Health Care Financing Administration. This research will be of interest to those who formulate health policy for elderly Americans. It will also interest the health-research community and those who manage alternative health plans.

SUMMARY

BACKGROUND

In an effort to control program costs, Medicare is trying new ways to pay for services. One method is to allow beneficiaries to enroll in alternatives to the traditional fee-for-service delivery system. The enthusiasm for encouraging Medicare beneficiaries to enroll in alternative health plans (AHPs) stems from evidence that health maintenance organizations (HMOs), historically the major example of prepaid systems, deliver less costly care than the fee-for-service sector (Luft, 1981; Manning et al., 1984). Preferred provider organizations (PPOs) have quickly become a popular insurance option for employers to offer their workers, and early evidence suggests that PPOs may also be effective in containing costs (Hosek, Marquis, and Wells, 1990).

AHPs restrict the providers from whom patients can receive care in an effort to control use and costs through utilization review, negotiated discounts, and other means. Plans restrict the patient's choice by refusing to pay benefits, or by paying lower benefits, for services received from providers who are not part of the panel. If beneficiaries value their freedom to choose a provider, then they face a cost when joining an AHP. Hence, the plan must offer some financial inducement to attract beneficiaries. The objective of this research is to analyze the trade-off between freedom of choice of provider and financial incentives to enroll in AHPs in Medicare beneficiaries' decisions.

APPROACH

Our data to estimate the demand for AHPs come from a mail survey of Medicare beneficiaries in which respondents were asked to state a preference between several hypothetical AHPs and their current Medicare coverage. We used responses about hypothetical plans rather than extant data about actual choices for two reasons. First, the hypothetical data allow us to sort out the influences of disparate factors on beneficiaries' preferences, something observational studies usually cannot do. Existing AHPs differ from traditional Medicare and from each other in many ways, making it difficult if not impossible to isolate the influences of specific features. Second, data about choices among the options now available to Medicare beneficiaries restrict the analysis to the range of options currently available. Yet Medicare continues to test the cost effectiveness of new forms of delivery systems as they emerge. Data about how attributes of delivery systems influence choice allow us to anticipate how new forms of plans might fare among Medicare beneficiaries.

Because the data consist of responses to hypothetical offers, however, some may question how well our results would predict beneficiaries' behavior if they really faced the choices we offer. Fortunately, several previous studies suggest that hypothetical questions about health care and health insurance do provide valid data. Of particular notice is a study of Medicare beneficiaries carried out by Rosko et al. (1985). They found that beneficiaries' preferences among hypothetical health plans accurately predicted actual enrollment in HMOs. In addition, our own results provide some evidence of external validity, as discussed below.

Each hypothetical plan was characterized in terms of the size and type of the panel of participating physicians; case-management policy; restrictions on hospital choice; enrollment period; out-of-plan coverage provisions; benefits for inpatient care, ambulatory care, long-term care, and prescription drugs; and the premium that the beneficiary would pay for the plan. Beneficiaries were given a description of a plan in terms of all attributes and a characterization of current Medicare in terms of the same attributes and were asked to respond "yes" or "no" to indicate whether they would join the new plan.

SAMPLE DESIGN

The Medicare Health Insurance Master file defined our sampling frame. This file identifies each person entitled to Medicare benefits and provides some information about the individual. We selected our sample from those entitled to benefits as of March 1988, excluding beneficiaries under age 65 and those in nursing homes. Residents of nursing homes were identified by address information in the Health Insurance Master file and by an initial screening question at the beginning of the interview. Our overall response rate was 43 percent. There were some differences in response rates among subgroups. Specifically, younger, higher income beneficiaries and those with telephones were more likely to complete the questionnaire. These differences might bias our conclusions if preferences among AHP attributes vary with beneficiary characteristics. However, we did not find interactions between beneficiary and AHP plan characteristics in enrollment preferences.[1]

MODEL SPECIFICATION

Our estimation model draws on economic theory about how individuals process and integrate information to choose among alternatives. By modeling how individuals integrate specific details into a set of summary outcomes and providing a decision rule, the model lets us generalize to many benefit packages that we have not studied, assuming that the model captures the process by which Medicare beneficiaries make choices.

The most widely used model of insurance plan choice is the expected utility model. Individuals evaluate the financial gains and losses of each plan—the changes in out-of-pocket expenditures for health care—and choose the plan that yields the highest expected utility or expected evaluation. In deciding whether to join an alternative delivery system, Medicare beneficiaries must also weigh the restrictions of freedom of choice. We specified the form of the utility function and used the survey data to estimate the parameters of the utility function. We compared the fit of the expected utility model to a descriptive model—one that makes no assumption about the form of the response to plan features. The expected utility model compared favorably to the descriptive model, so the results we report here are based on the expected utility model.

RESULTS

Demand for AHPs has a statistically significant relationship with both price and changes in the expected value of the benefit package. The elasticity of demand with respect to changes in price is –0.6; that is, a 10-percent increase in premium will decrease enrollment by 6 percent. The elasticity of demand with respect to benefits is 0.5; a 10-percent increase in the value of the benefit package will lead to a 5-percent increase in enrollment.

Demand is somewhat more responsive to changes in the price than to changes in the expected value of the benefits. This may be because the loss in utility associated with a financial loss is greater than the increase in utility of a financial gain of the same size. It may also be that people weigh known or certain outcomes more heavily than outcomes that are merely possible. Both hypotheses have been offered in the literature. With the data at hand, we cannot separate them.

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[1] Of course, there may be differences in unmeasured characteristics of respondents and nonrespondents that affect the likelihood of AHP enrollment and would therefore affect the generalizability of our results.

We find a statistically significant decrease in the likelihood of enrolling in an AHP as the provider panel becomes more restricted, showing that beneficiaries do value the freedom to choose a provider. In addition, plans that require patients to use certain hospitals are less attractive than those that allow the patient and provider to choose any hospital in the area. Beneficiaries, however, do not favor plans that allow them to self-refer to providers over plans that require the primary care provider to refer the patient. Plans that require a one-year enrollment and do not reimburse for out-of-plan use are significantly less attractive to beneficiaries than plans that have shorter enrollment or that do provide some reimbursement if the patient goes to providers who do not participate in the plan.

The conclusions that we drew from our model assume that responses to hypothetical questions do adequately reflect behavior that would be observed if an actual choice was offered. To the extent that we can find similarities between our estimates and observed behavior, this assumption is validated. Our estimates of the price elasticity of demand for insurance benefits are quite similar to estimates of the demand for supplemental benefits based on observed purchase of Medigap policies. Furthermore, we simulated expected enrollment shares in three selected sites with a Medicare competition demonstration. The predicted and actual enrollments compared favorably in two of the three sites. Thus, we believe our model provides some evidence about the potential role for AHPs in the Medicare market. However, our model predicted substantially higher enrollment in one Medicare demonstration site than was observed. This suggests that local factors—marketing, plan location—may play a large role as well.

IMPLICATIONS FOR MEDICARE

In 1989, only 5.9 percent of aged Medicare beneficiaries were enrolled in HMOs and other competitive health plans that contract with Medicare. In contrast, HMOs enroll about 18 percent of individuals covered by private group insurance. Our choice model suggests that Medicare beneficiaries can be attracted to participate in HMOs at a similar rate if offered the opportunity. We simulated potential enrollment rates for HMOs that offered Medicare beneficiaries a benefit package that was typical of some of the early plans that signed risk contracts with Medicare. These simulations suggested that about 15 percent of the beneficiaries could be attracted to AHPs.

To attract this share of beneficiaries to participate, plans must offer substantial financial incentives to encourage Medicare beneficiaries to give up their freedom to choose providers, which they enjoy under the traditional Medicare fee-for-service plan. Medicare beneficiaries particularly seem to value benefits that reduce their risk of catastrophic hospital bills and long-term care benefits. They seem to place less importance on preventive benefits. However, preventive care is often a key emphasis of many HMOs. This lack of congruence between the HMO emphasis and the types of benefits Medicare beneficaries most value may be a factor in low Medicare enrollments in AHPs.

Whether HMOs and other AHPs experience favorable or adverse selection has received a great deal of research attention. Answers to this question are important for designing Medicare AHP policy. Our results show evidence of adverse selection (in terms of patient preferences). We find a statistically significant higher probability of selecting an AHP option among those anticipating poor or high expenditures than those expecting to be healthy or to have low levels of medical spending. The result obtains for both the net effects (other factors constant) and gross effects (other factors varying). The magnitude of the effect is larger when looking at gross effects, indicating that there are other variables that are related to both health perceptions and AHP preferences.

Thus, our analysis of factors associated with choice suggests that the favorable selection that has been found in some studies is not a consequence of preferences for AHPs by healthier beneficiaries. In contrast, we found that the predicted likelihood of choosing an AHP was higher among individuals who anticipated high levels of spending in the next year. To the extent individuals can adequately forecast their future health needs, our findings suggest the potential for adverse selection. Moreover, prior utilization did not show the same relationship to enrollment preferences. Yet including prior utilization in determining the payment (the Average Adjusted Per-Capita Cost, AAPCC) to AHPs is often recommended to correct for selection problems. However, if individuals have information about their future health needs that is not reflected in prior use, this adjustment to the AAPCC may not overcome selection problems, and plans could experience economic losses threatening the sustainability of the Medicare capitation option. Research on the nonelderly population has demonstrated that an individual's expectations about future health-care use do predict subsequent spending (Marquis and Holmer, 1986). However, whether Medicare beneficiaries have information about their future health-care needs that we cannot predict based on observable demographic characteristics and prior spending is a topic for future research. If beneficiaries do have such knowledge about their health needs, the Health Care Financing Administration may wish to explore whether incorporating beneficiary self-assessments in setting HMO payment is a feasible or practical way of correcting for selection.

ACKNOWLEDGMENTS

A number of individuals have provided us with valuable assistance in carrying out this project. We are especially indebted to Naihua Duan and Ker-Chau Li who developed the experimental design for the study. Sandra Berry, John Haaga, and Kathleen Lohr assisted with the initial data collection design. Daniel Byrne played a number of important roles in the data collection effort; he analyzed the Medicare data to determine the sampling strategy, implemented the sample design, and worked with the survey group at RAND to ensure the integrity of the sample. Julie Brown skillfully managed a very complex data collection effort. Sally Carson developed the software to generate the experimental design points, and she, along with Carol Edwards, developed software to produce each resultant questionnaire. Carol Edwards also carefully cleaned the survey data, constructed many of our measures, and linked our survey data with the data we acquired from the Medicare Statistical System. Our RAND colleagues, Joan Buchanan and Grace Carter, and our project officer at HCFA, Armen Thoumaian, provided helpful and constructive comments on an earlier draft of this report. We are also grateful to Barbara Thurston for preparation of the manuscript.

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1. INTRODUCTION

BACKGROUND

In an effort to control program costs, Medicare is trying new ways to pay for physician services. One method is to allow beneficiaries to enroll in alternatives to the traditional fee-for-service delivery system. The Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) authorized prepayment and other provisions to encourage health maintenance organizations (HMOs) and other competitive medical plans to participate in Medicare and to encourage beneficiaries to enroll in prepaid plans. Currently, Medicare is sponsoring demonstration projects to evaluate the potential role of preferred provider organizations (PPOs).

The enthusiasm for encouraging Medicare beneficiaries to enroll in alternative health plans (AHPs) stems from evidence that HMOs, historically the major example of prepaid systems, deliver less costly care than the fee-for-service sector (Luft, 1981; Manning et al., 1984). PPOs have quickly become a popular insurance option for employers to offer their workers, and early evidence suggests that PPOs may also be effective in containing costs (Hosek, Marquis, and Wells, 1990).

AHPs share a feature that is not part of the traditional Medicare system: They restrict the providers from whom patients can receive care. By channeling patients to a restricted set of providers, the plan can try to control use and costs through utilization review, negotiated discounts, and other means. Plans restrict the patient's choice by refusing to pay benefits, or by paying lower benefits, for services received from providers who are not associated with the plan. Beneficiaries who value their freedom to choose their own providers face a cost if they join an AHP. In addition, patients who give up established physician relationships to join an AHP also give up a valued attribute of their care (Ware et al., 1978).[1] Hence, the plan must offer some financial inducement to attract beneficiaries.

The Health Care Financing Administration (HCFA) Medicare capitation demonstrations suggest that beneficiaries will be attracted to AHPs, given strong enough financial incentives. Galblum and Trieger

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[1] In our sample, 91 percent of beneficiaries report that they have a usual source of care.

(1982) conclude that financial considerations are important in Medicare beneficiaries' AHP enrollment decisions. This conclusion is based on the high rate of enrollment in two AHPs participating in the Medicare capitation demonstration project; these AHPs offered beneficiaries a generous benefit package. In contrast, enrollment rates were much lower in other AHPs, which provided much less generous benefits. Further, financial aspects, including benefits and costs, are the reasons beneficiaries most often cite for joining an AHP (Friedlob and Hadley, 1985).

However, there are no quantitative estimates of how Medicare beneficiaries' decisions to join AHPs respond to financial incentives. Studies of employee groups suggest that a 10-percent decrease in the premium of an AHP increases enrollment by about 2 to 5 percentage points for an open-panel AHP and about 1 to 2 percentage points for a closed-panel AHP (Marquis et al., 1985). However, some believe the elderly will be more reluctant than younger people to break existing physician ties and enter AHPs (Bonanno and Wetle, 1984); consequently, the response among Medicare beneficiaries may be smaller. A major objective of this study was to collect data to enable us to estimate the response to financial factors.

To play a meaningful role in Medicare cost-containment efforts, AHPs will have to attract enough Medicare beneficiaries—including both high and low users of services. To increase enrollment, policymakers have proposed reforms that could expand the options available and increase the financial incentives for beneficiaries to enroll. Evaluating these proposals requires estimates of how Medicare beneficiaries' decisions to enroll in AHPs respond to price and other financial incentives.

ROLE OF THIS STUDY

The objective of this study was to develop information about the role of financial incentives to help HCFA evaluate alternative policies. To do this, we developed a method of data collection and analysis to allow us to model the influence of AHP attributes on beneficiaries' choices and how this influence differs among subgroups of beneficiaries. We set out to develop a model that would help HCFA evaluate the following issues:

- What plan benefits do Medicare beneficiaries value most?

- What restrictions on provider choice are most influential in the decision to join AHPs?
- What role does price play in the decision?
- What is the expected degree of biased selection in new systems?

Our data collection methods are described in the next section. Section 3 discusses the model specification, and Sec. 4 presents the results of the model estimation and evaluation. In Sec. 5 we use the model to evaluate the issues raised above. Some concluding observations are given in Sec. 6.

2. STUDY DESIGN AND DATA

STUDY DESIGN

Approach

Our data to estimate the demand for AHPs come from a mail survey of Medicare beneficiaries in which respondents were asked to state a preference between several hypothetical AHPs and their current Medicare coverage. We used responses about hypothetical plans rather than extant data about actual choices for two reasons. First, the hypothetical data allow us to sort out the influences of disparate factors on beneficiaries' preferences, something observational studies usually cannot do. Existing AHPs differ from traditional Medicare and each other in many ways, making it difficult if not impossible to isolate the influence of specific features. Second, data about choices among the options now available to Medicare beneficiaries restrict the analysis to the range of options currently available. These data would have been inadequate because Medicare continues to test the cost-effectiveness of new forms of delivery systems as they emerge. Data about how attributes of delivery systems influence choice allow us to anticipate how new forms of plans might fare among Medicare beneficiaries.

Because the data consist of responses to hypothetical offers, however, some may question how well our results would predict beneficiaries' behavior if they really faced the choices we offer. Fortunately, several previous studies suggest that hypothetical questions about health care and health insurance do provide valid data. Studies in both marketing and economics have offered some indirect evidence that stated preferences do predict actual behavior (see, for example, Granbois and Summers, 1975; Wolf and Pohlman, 1983). Split-sample comparisons show the predictive validity of responses about hypothetical health-insurance-plan offers (Hershey et al., 1985). Analysis of health-insurance demand using the hypothetical data produced estimates of the price elasticity of demand for health insurance that compared favorably with recent empirical studies that use actual health-insurance-plan choice data (Marquis and Phelps, 1987; Marquis and Holmer, 1986). Of particular notice is a study of Medicare beneficiaries carried out by Rosko et al. (1985). They found that beneficiaries' preferences among hypothetical health plans accurately predicted actual enrollment in HMOs.

We characterized each hypothetical AHP in our survey by the 13 attributes listed in Table 2.1. Beneficiaries were given a description of a plan in terms of all attributes, a characterization of current Medicare in terms of the same attributes, and were asked to respond "yes" or "no" to the question whether they would join the new plan. An example of the way the hypothetical plans were presented is given in App. A.

Several considerations guided our choice of attributes. We wished to study attributes of AHPs that policymakers might influence. Thus, we focused on attributes that are, or might be, used to qualify AHPs and on financial aspects of the AHPs. Attributes characterizing the degree of provider choice restriction are intended to capture the restrictions that AHPs impose to make costs more controllable and predictable. The combinations of attribute values do not necessarily depict actual AHPs available to Medicare beneficiaries. Rather, the combinations of attribute values were chosen using experimental design principles so that we can estimate the influence of each attribute on beneficiary preferences. We can then *predict* enrollment in an AHP characterized by any combination of the attributes.

Experimental Design

The experimental design concerns (1) how we combine values of attributes to describe the alternative plans and (2) how we assign the resulting combinations or plan descriptions to the survey respondents. The technical detail concerning the development of the experimental design is presented in a research design note (Marquis, Duan, Li, et al., 1988); here we summarize a few essential details.

Our design was intended to allow us to estimate the main effects of plan attributes, important interactions among attributes, and differences in the way that subpopulations of Medicare beneficiaries respond to plan attributes, as precisely as possible given the cost constraints. We have 12 nonprice attributes that take on a discrete number of values. A design that included all possible combinations of the nonprice attributes (a full factorial design) would enable us to estimate the main effects of these factors and all interactions among them. However, for our 12 nonprice attributes, this would yield 41,472 possible hypothetical plans; clearly we cannot present this many AHPs. Moreover, we are primarily interested in the main effects and in first-order interactions among the attributes. We can estimate the desired effects by appropriate selection of a subset of all

Table 2.1

Attributes of Prototypical Alternative Health Plans

Attribute	Alternative Levels
Provider choice restrictions	
(A) Physician choice	Assume usual provider not a member and choose from: • list that includes 50% of area providers • list that includes 10% of area providers • providers practicing at the plan facility or facilities (about 10% of area providers participate) Assume usual provider is a member and choose from: • providers practicing at the plan facility or facilities (about 10% of area providers participate)
(B) Hospital choice	• Any hospital patient and doctor choose • Those hospitals associated with plan
(C) Enrollment	• Can disenroll with 30 days notice • Enrollment for 1 year
(D) Case management	• Patient can self-refer to specialists • Personal physician is gatekeeper to specialty care
Premium	
(E) Monthly premium	Quoted premium is -A + B*(actuarial value of additional benefits G-L) + C*(actuarial value of M) where ranges are: A from 0 to \$50; B from 0.5 to 1.5; C from 0.05 to 1.5; and A, B, and C are generated randomly.
Plan benefits	
(F) Reimbursement for out-of-plan use	• 50% cost to maximum of \$500 per year • No reimbursement

Table 2.1—continued

Attribute	Alternative Levels
Hospital benefits	
(G) Deductible	• Current Medicare deductibles • $100 per admission • No deductible
(H) Copayment	• Current Medicare copayment • No copayment
Physician benefit	
(I) Deductible	• Current Medicare deductible • No deductible
(J) Copayment	• Current 20% • $5 per visit • No copayment
(K) Preventive visits	• No coverage (current Medicare provision) • $5 per visit copayment • Covered in full
Other benefits	
(L) Drug benefit	• No coverage (current Medicare provision) • All prescribed drugs with $5 copayment per refill • All prescribed drugs, no charge
(M) Long-term nursing home care (custodial care)	• No coverage (current Medicare provision) • $25 per day copayment

possible combinations of the attributes (a fractional factorial design). With 324 attribute combinations, we can estimate all main effects and first-order interactions; higher level interactions, however, are confounded and cannot be estimated.

To estimate the interaction between attribute effects and individual characteristics, we want plan attributes and beneficiary characteristics to be independent. Since we cannot achieve this by presenting all 324 attribute combinations to each individual, we formed small clusters of individuals who were matched in terms of important characteristics and assigned a fractional factorial design to each cluster. Early design and pretest work indicated that we could present each respondent with nine hypothetical AHPs—or attribute combinations—without imposing an undue burden and consequently increasing form and item nonresponse. Therefore, presenting 36 similar individuals with nine plans each provided the complete factorial design of 324 attribute combinations.

In summary, our experimental design consists of a collection of fractional factorial designs, one for each cluster of matched individuals. Our primary cluster consists of 36 individuals; each individual in the cluster is asked about nine AHPs or attribute combinations. We will refer to the set of nine alternatives presented to an individual as a subdesign.

Sample Design

The Medicare Health Insurance Master file defined our sampling frame. This file identifies each person entitled to Medicare benefits and provides some information about the individual. Our sample was selected from those entitled to benefits as of March 1988. We excluded beneficiaries under age 65 and those in nursing homes. Residents of nursing homes were identified by address information in the Health Insurance Master file and by an initial screening question at the beginning of the interview.

We grouped beneficiaries into 21 primary strata (see Table 2.2) according to the individual's age, the number of years in the previous four with expenditures for physicians' services exceeding the Medicare Part B deductible, whether Medicare Part B coverage is provided under a state Medicaid buy-in,[1] and whether we were able to obtain a

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[1] For persons eligible for both Medicare and Medicaid, the state can "buy in" to Medicare by paying the Part B premium. Medicare makes the primary payments, and the Medicaid obligation is limited to the deductible and coinsurance amounts.

Table 2.2

Primary Sampling Strata

Beneficiary Characteristics			
Age	Level Prior Health Use	Phone	No Phone
		(Stratum Number)	
Not covered by Medicaid buy-in			
65–66	Low	1	19
65–66	High	2	20
67–69	Low	3	
67–69	Medium	4	
67–69	High	5	
70–74	Low	6	
70–74	Medium	7	
70–74	High	8	
75–79	Low	9	
75–79	Medium	10	
75–79	High	11	
80 and older	Low	12	21
80 and older	Medium	13	
80 and older	High	14	
Covered by Medicaid buy-in			
65–79	Low, Medium	15	
65–79	High	16	
≥ 80	Low, Medium	17	
≥ 80	High	18	

NOTE: Level of prior use is measured as the number of years during 1984 to 1987 that the beneficiary had Medicaid-covered Part B services above the deductible. Low is 0 for persons under 68 and 0–1 for others; medium is 1 for those age 67, 1 or 2 for those age 67 and 68, and 2 or 3 for others; high is 1 or more for those age 65 or 66, 2 or more for those age 67, 3 or more for those age 68, and 4 for all others. The different definitions result because beneficiaries have been entitled for different numbers of years.

telephone number for the beneficiary using a telephone match service. Age and the prior medical expense measure are proxies for health status. We used the Medicaid buy-in as a proxy for income. Health status and income are characteristics that we hypothesize might influence the way that beneficiaries respond to changes in plan attributes.

We defined strata based on whether we were able to find a phone number for the beneficiary because of results from our pretest of the study design. Ours was a mail survey, but we made initial contacts by phone to inform sample persons about the purpose of the study and to encourage participation. Some subsequent contacts were also by phone. In a pretest of this study, however, we discovered that we would be unable to obtain phone numbers for about 40 percent of the persons selected for the sample. Pretest response rates for those we were unable to contact by phone were much lower than for those we were able to call. Therefore, the cost per completed case was much higher for those for whom we were unable to obtain phone numbers. The cost of data collection would be much lower if we included only beneficiaries for whom we could obtain a phone number. However, to guard against differences in unmeasured characteristics that might be related both to our ability to obtain phone numbers and to the response to changes in AHP attributes, we included individuals for whom we could not obtain phone numbers in three primary strata in the sample to test if the response differed.[2]

From each of the 21 primary strata we selected 36 individuals—the cluster size required for our complete fractional factorial design of 324 attribute combinations.[3] Within the 21 primary strata, we further stratified according to the level of AHP enrollment among Medicare beneficiaries in the individual's residence area.[4] We viewed this last measure as a proxy for beneficiary awareness and understanding about the AHP option. We hypothesized that awareness may affect the response to changes in plan attributes. For each of the 21 primary clusters, we selected 12 individuals from areas with very low (virtually no) AHP enrollments, 12 from areas with moderate enrollment, and 12 from areas with high enrollment, yielding the required cluster size of 36 individuals within a primary statum. We assigned the 324 attribute combinations to each substratum defined by Medicare AHP enrollment in the area in a way that allowed us to estimate how the main effects of attributes interact with AHP enrollment in the area.

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[2] An example of an unmeasured characteristic that might be related to our ability to find a telephone match and to the response to changes in AHP attributes might be the beneficiary's mobility or whether the beneficiary maintains summer and winter residences.

[3] The strata do not represent equal numbers of Medicare beneficiaries; however, we select equal sample sizes in each cluster. Therefore, beneficiaries belonging to different groups have differential selection probabilities. Weighting is necessary to produce representative estimates. Weighting is discussed in Sec. 3.

[4] The enrollment rates were defined at the three-digit zip code level. The stratification levels were (a) no enrollment in the area, representing 40 percent of beneficiaries; (b) fewer than 10 percent of beneficiaries enrolled, representing 40 percent of beneficiaries; (c) more than 10 percent enrolled, representing 20 percent of beneficiaries.

Field Procedures

Based on our pretest experience, we concluded that we could expect only about a 50-percent response rate, even among those respondents that we were able to contact by phone to encourage participation. These high nonresponse rates would result in missing responses about many of the 324 attribute combinations assigned to each cluster and could threaten our ability to estimate the effects of interest. In an effort to maximize the proportion of distinct attribute combinations in each cluster for which we obtained a response, we (1) administered the survey in two waves and (2) mailed replicates of each subdesign.

In the first wave, we selected 36**r* individuals and administered *r* replicates of each subdesign. In the second wave, we selected *s* replicates for each subdesign that was not completed, that is subdesigns for which none of the initial *r* replicates was returned.[5] Given the objective of minimizing the number of empty subdesigns, the optimum number of replicates *r* and *s* depends on the number of subdesigns, the nonresponse rate, and the budget (see Marquis et al., 1988). Given the nonresponse rates in our pretest, we chose *r* equal 2 for the phone stratum and *r* equal 4 for the stratum for which we did not have phone numbers. For the second wave, the optimum number of replicates, *s*, for the phone stratum was 3; for the stratum for which we did not have phone numbers, *s* was 5.

In the first wave, we had a sample of 1323 individuals in the phone stratum (this includes 27 replacements for individuals discovered to be deceased or in nursing homes during the initial phone contact) and 432 individuals in the stratum for which we did not obtain phone numbers. In the second wave, we selected 645 individuals for the phone stratum and 1065 for the no-phone stratum.

Response Rate Analysis

Form Response. The overall response rate was 43.4 percent, with 1052 complete surveys.[6] The response rate in the phone group was higher than for the no-phone group, with an overall response rate of 46.7 percent in the phone group (886 completed surveys) and 31.5 percent in the no-phone group (166 completed surveys). Some of the difference in response rates between the groups may be because we were unable to identify all selected names who are not part of the sampling frame (namely, deceased individuals and those in institutions) when we have no contact. That is, the response rate among eligible sample members in the no-phone stratum is probably higher than the return rate, which is the number that we calculated as the response rate for the no-phone group.

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[5] Recall that we define a subdesign to be the nine AHPs, or combinations of attributes, assigned to an individual respondent.

[6] Response rates are calculated after excluding from the sample base individuals who were selected but subsequently were discovered to be deceased or in nursing homes. These rates are consistent with the expected response rates in a mail survey of Medicare beneficiaries who are not compensated for completing the form based on our pretest experience. Regulations prevented us from offering compensation.

To investigate other factors that influence response, we fitted a probit model to explain the probability of a returned form as a function of demographic and health-care use characteristics about sample persons obtained from the Medicare Statistical System. (The probit regression estimates are given in App. B.) In addition to differences between the phone and no-phone groups, response to the survey varied by age and income. The response rate did not vary by health status (measured by prior health-care use), region of residence, or the AHP Medicare market share in the area.

The probability of returning a form decreases as age increases. Holding all other characteristics constant, response rates are 8 percentage points lower among beneficiaries age 67 to 69 than among beneficiaries age 65 to 66. For those over 80, response rates are 19 percentage points lower than rates for the youngest beneficiaries. Beneficiaries covered under Part B through Medicaid buy-in agreements (our proxy measure for income in sampling) have lower response rates than others. Holding all other factors constant, these poorer beneficiaries have response rates that are 11 percentage points lower than nonpoor beneficiaries.

Item Response. The completeness of our experimental design depends on respondents' evaluating all of the AHP plans presented as well as returning the form. Among the people who completed the survey, 81.9 percent responded about at least five of the nine plans that they were presented, 77.0 percent responded to at least eight, and 63.5 percent answered about all nine hypothetical AHPs. Only 10.7 percent responded about none of the AHP hypotheticals. In total, we had responses for 7606 different AHPs.

To analyze factors related to item nonresponse, we fitted a probit regression model to explain the likelihood of answering about at least eight of the AHPs presented (see App. B for the probit regression coefficient estimates). Item response correlates were similar to correlates of form nonresponse. Among people who completed the survey, responses about at least eight of the AHPs presented were related to income and the age of the beneficiary. The probability of answering at least eight questions was not related to health status, region, or the AHP share of Medicare enrollment in the area. Given that a form was returned, there was no statistically significant difference between the phone and no-phone strata in the probability of completing at least eight hypotheticals; however, the direction of the effect was lower item response among those in the no-phone stratum.

Item response, as well as form response, decreases with age. Holding all other factors constant, the proportion of beneficiaries age 67 to 69 who respond to at least eight AHP hypothetical plans is 6 percentage points lower than for beneficiaries age 65 to 66. For beneficiaries over age 80, the likelihood of completing at least eight hypotheticals is 10 percentage points lower than for younger beneficiaries. Beneficiaries covered under Medicaid buy-in arrangements were less likely to respond to at least eight hypotheticals than those not receiving it. Holding all other factors constant, 4 percent fewer of these poorer beneficiaries complete at least eight hypotheticals than nonpoor beneficiaries.

Experimental Design Response. Overall, we obtained a high rate of completion for the design. We obtained responses for 84 percent of the hypotheticals presented to beneficiaries in the phone stratum and for 81 percent of the AHPs given to those in the no-phone stratum. In each group, most of the experimental design nonresponse is due to item nonresponse rather than form nonresponse for subdesigns. In the phone stratum, 2 percent of the attribute combinations are missing because of form nonresponse and 14 percent because of item nonresponse in completed questionnaires. For the no-phone stratum, 5 percent of the attribute combinations are missing because of form nonresponse and 14 percent because of item nonresponse.

DATA

In addition to the attributes of the plan options and the respondent's indication of whether he or she would enroll in the plan, we collected information about beneficiaries that other studies have theoretically or empirically related to plan choice. Some of the measures were obtained from Medicare data files and some are measures taken in the survey.[7]

Beneficiary Characteristics

Data from the Medicare Health Insurance Master file provided us with basic demographic characteristics including age, sex, and coverage for Part B under Medicaid state buy-in agreements. We also measured the AHP enrollment share in the local area using data from the Medicare Statistical System. From the survey, we collected additional sociodemographic characteristics, including race, family income, and information about the purchase of private health insurance to supplement Medicare.

Beneficiary Attitudes

Beneficiaries' satisfaction with their current health care is likely to influence the decision to select an alternative plan. Previous research has demonstrated that patient satisfaction is strongly related to subsequent doctor shopping (Marquis et al., 1983). Patients who are considering changing their doctor may be quite willing to consider joining an AHP.

To measure this influence, we adapted the Patient Satisfaction Questionnaire originally developed by John Ware and his colleagues (Ware et al., 1976). The reliability of this measure and its validity as a predictor of patient behavior in a general population has been widely studied and documented. For this research, we measured two aspects of patients' attitudes: general satisfaction with care and attitudes about financial aspects. We include the general satisfaction measure because it predicts subsequent provider change. We include satisfaction about financial aspects of care because beneficiaries who are dissatisfied with the cost of traditional fee-for-service coverage may be more attracted by the financial benefits of joining an AHP than beneficiaries who are satisfied with this aspect of care.

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[7] An example of the way the hypothetical plans were presented in the survey is shown in App. A. Marquis et al. (1988) includes a complete representative questionnaire.

Beneficiary Anticipated Health Risks

When a beneficiary evaluates whether to join an AHP, he or she is uncertain about the future occurrence of illness, the use of medical services, and hence the financial consequences of choosing the AHP or staying with the traditional Medicare plan. The distribution of the beneficiary's anticipated expenditure for medical care in the future year determines the anticipated financial consequences of choosing an AHP with enhanced benefits. Because of deductibles in Medicare, it is the distribution of anticipated expenditures, not just the mean anticipated spending, that enters the calculation. In addition, since the role of insurance is to reduce uncertainty, we would expect that the variability of the distribution of health risks the individual faces, as well as the anticipated risk, would influence the decision to join an AHP. Thus, we hypothesized that beneficiaries would be more likely to join an AHP offering more generous coverage than the current Medicare plan, the greater the anticipated level of spending and the more variable the distribution.

The distribution of anticipated future medical spending facing any individual beneficiary is based on the distribution of anticipated expenditures reported by all respondents with the same attributes as that individual. Beneficiaries reported their anticipated health spending for a variety of services in the survey. The questions covered inpatient care, physicians' services for medical problems and for preventive care, drug purchases, and long-term care. Answers were given in fixed interval categories. We converted the intervals into a dollar figure in the following way: For Medicare-covered services (hospital care and physician care for medical problems), we used the mean actual expenditures for the calendar year prior to the survey for respondents whose observed expenditures were in the interval category.[8] For services that are not covered by Medicare, we used the midpoint of the response interval to obtain a dollar value for the interval.

We simulated the distribution of anticipated expenses facing an individual by using a seven-equation regression model to explain respondents' reported anticipated spending for various medical services. The first equation was a probit equation for the probability of anticipating any expenditures for covered Medicare services.[9] The second equation was a probit for the probability of anticipating some inpatient use, given that the individual anticipates some expense. These two equations separate health outcomes into three types: (1) an outcome involving the anticipation of inpatient dollars (and ambulatory care); (2) an outcome involving the anticipation of ambulatory care for covered services but no inpatient care; and (3) an outcome with no anticipated purchase of Medicare-covered services. The next three equations were linear regressions for the logarithm of anticipated dollar levels of spending for Medicare-covered services. Separate equations were estimated for those anticipating only ambulatory care and those anticipating inpatient care. The equations include hospital spending for those anticipating inpatient care, physician spending for those anticipating inpatient care, and physician spending for those expecting only ambulatory treatment. The final two equations were regressions for the logarithm of anticipated prescription drug spending and for the logarithm of anticipated spending for preventive care.[10] The explanatory variables in each equation included:

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[8] Actual expenditures were obtained by extracting data for the calendar year prior to the survey for our respondents from the Medicare Automated Data Retrieval System (MADRS).

- An indicator set equal to one if the individual had any spending for Medicare-covered services in the calendar year prior to the survey. This was measured by extracting records from the Medicare Automated Data Retrieval System (MADRS) for survey respondents.
- The natural log of total charges for all Medicare-covered services in the calendar year prior to the survey (zero if no charges), also measured from MADRS.[11]
- Perceived future health status using a health assessment instrument developed as part of the RAND Health Insurance Experiment (Brook et al., 1979). The scale is the average response to six questionnaire items—each scored from 1 to 5. The scale score thus runs from 1 to 5, with higher scores indicating higher perceived future health.

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[9] Let $Y = 1$ if the beneficiary anticipates medical expenditures in the next calendar year and 0 otherwise. The probit model for the probability that $Y = 1$ is $P(Y = 1) = \Phi(X\beta)$, where Φ is the standard normal cumulative distribution function, the vector X includes the characteristics of the beneficiary, and the vector of β are the parameters to be estimated.

[10] Because of reported anticipations of zero, the dependent variable in these last two regressions was the logarithm of reported anticipated spending +1.

[11] For beneficiaries newly entitled during the survey year, there is no previous Medicare history. This measure and the indicator measure above are set to zero, and an age indicator variable is included to reflect new entitlement.

- A measure of limitation in one's ability to function in everyday life based on the average response to six questionnaire items, each scored 1 to 2; higher scores indicate poor health.
- Sociodemographic measures from the Medicare Health Insurance file and beneficiary survey (race, age, 1987 family income, marital status, sex, premium paid for supplemental insurance policies; whether covered for Medicare under state Medicaid buy-in).

The equations are given in App. C.

Given the expenditure model and the characteristics of the individual, we predicted each respondent's anticipated average expenditure in the next year and took repeated drawings from the distribution of disturbances from the regression models to generate the anticipated expenditure distribution. We first determined the outcome state (inpatient spending, ambulatory spending for medical problems, no medical use or preventive care and drug purchases only). In determining spending levels, we drew from the joint empirical distribution of residuals from the expenditure-level equations, depending on the outcome state to account for the correlation of residuals across services. We took 50 draws for each beneficiary, yielding a set of expected outcomes, each of which has a 0.02 probability and is characterized by spending levels for each type of service.

Because the need for long-term nursing-home care in the next year is rarely anticipated, we adopted a somewhat different strategy for imputing long-term nursing-care anticipations for each of the 50 possible outcomes for a beneficiary. In our sample the proportion of beneficiaries who reported that they anticipated positive spending for Medicare-covered services and for long-term nursing care was 0.03. Therefore, if an individual's imputed, expected outcome involved positive anticipations of inpatient expenditures or physician expenditures for a medical problem, we drew from a binominal distribution with a probability of 0.03 to assign the expectation of having a nursing-home stay. If a long-term nursing care stay is imputed, we assigned the mean anticipated spending reported in the survey by those anticipating such spending—$6305.[12]

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[12] The long-term care benefit offered by the hypothetical AHPs was intended to cover nursing homes and related care homes that provide nursing and personal-care services. It was defined to respondents as custodial care. Although the risk of nursing-home care increases with age, we did not use age-specific assessed probabilities of requiring long-term care in the inputation because of small sample sizes. Nonetheless, the imputed long-term care risk does increase with age, since the imputation of long-term care anticipations is conditional on imputed anticipations of receiving care, and the latter increases with age.

Similarly, our anticipation data do not provide us with data to estimate expected hospital lengths of stay. This information is needed to determine the expected value of eliminating hospital copayments for stays longer than 60 days. Unpublished data from HCFA indicate that about 2.4 percent of hospitalized patients incur liability for coinsurance or lifetime reserve days and that the average cost-sharing for these persons is $3650. We used these secondary source estimates to impute an expected benefit from eliminating the hospital copayment to outcomes involving a hospitalization.

The resulting expenditure distribution has an associated distribution of patient cost-sharing, given current Medicare provisions. The distribution of patient cost-sharing was used to develop several measures included as explanatory variables in our model of plan choice. We estimated the mean of the distribution as a measure of expected financial risk or health status. We calculated the standard deviation of the distribution of out-of-pocket risk as a measure of uncertainty. We used the distribution to calculate, for each beneficiary, the expected value of the additional benefits the AHP offered in terms of reduced out-of-pocket spending for health care relative to traditional Medicare coverage.

Comparison of Expectations and Other Data Sources

To see how valid respondent expectations about future health-care spending are, we compared estimates of the expected value of the added benefits that were offered in the hypothetical AHPs based on respondent reported expectations with estimates of the average value of the benefit based on the MADRS data on prior-calendar-year medical charges for our survey respondents and with secondary data collected from a variety of sources.[13] The comparisons are shown in Table 2.3 for selected values of the added benefits.[14] Respondent expectations seem to be quite consistent with actual spending. The largest discrepancy is in the estimate of the value of the long-term care benefit; the expected value of the benefit falls below our estimate of the average value of the benefit based on secondary sources. However, the secondary-source estimates are based on long-term care

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[13] For beneficiaries who became newly entitled between January 1, 1987, and March 1988 (the date on which the population for our sample was established), the MADRS results may not include all utilization in calendar year 1987 and so may slightly underestimate the actual value of the added benefit to the sample.

[14] Estimates from the survey were reweighted to adjust for the oversampling of certain subgroups based on our stratification design and for nonresponse. See Sec. 4 for a discussion of the weighting.

Table 2.3

Expected Value of New Benefits Based on Alternative Data Sources (Expected Change in Annual Out-of-Pocket Spending, in adjusted 1987$)

New Benefit	Secondary Data	MADRS	Respondent Expectations
Hospital copayment for 60+ days[a]	31.20	N/A	—[b]
Hospital deductible[c]			
$100	100.00	74.10	105.10
$0	123.60	90.40	129.00
Eliminate physician deductible[d]	39.60	42.00	41.40
Physician copayment 10%[e]	110.40	93.40	88.50
Drug copayment 30%[f]	172.80	N/A	177.30
Long-term care copayment 30%[g]	208.80	N/A	137.60
Preventive copayment 10%	N/A	N/A	127.20

NOTE: N/A = not available.

[a] Unpublished data from HCFA and from the U.S. General Accounting Office (1989).

[b] As discussed in the text, we use the secondary data to impute a respondent expectation but we do not have data from the respondent survey to calculate this benefit.

[c] Unpublished data from HCFA.

[d] Waldo and Lazenby (1984) (1987 dollars).

[e] The $5 cost-sharing level offered in some hypothetical plans estimated as 10% of average charge per service (Helbing and Keene, 1989) and per office visit for persons age 65 and older (Rossiter and Salomon, 1981); the value of reducing the copayment to 10% based on data in Waldo and Lazenby (1984).

[f] The $5 per prescription benefit estimated as a 30% copayment based on data on the average cost of a prescription for Medicare beneficiaries (Moeller and Mathiowetz, 1989); value of reducing copayment to 30% also from Moeller and Mathiowetz.

[g] The $25-per-day benefit estimated as a 30% copayment using data on the average price of a stay in a nursing home (Topolnicki, 1986); value of benefit based on annual discharges from nursing homes among persons over 65 and the average duration of stay (to a maximum of six months) (Sekscenski, 1987). A six month maximum expected duration in next calendar year assumes, on average, an admission occurs at midyear.

discharges for all aged persons, whereas our sample may be healthier than average, since we exclude those in institutions at the time of the survey. In addition, it is likely that individuals do not foresee health consequences leading to nursing-home admission; that is, the perceived risk may be less than the actual risk. However, plan decisions are presumably based on perceived risk.

The respondent expectations shown in Table 2.3 are average values across the sample. We use each individual's own expected evaluation of the benefit based on the imputed expenditure distribution to model his or her plan choice.

3. MODEL SPECIFICATION AND ESTIMATION

MODEL SPECIFICATION

We have taken two approaches to estimating the relationship between characteristics of the plan and the likelihood that an individual would be willing to join such an AHP. One approach fits a descriptive model, the other a decisionmaking model. We used two alternative specifications of the utility function in fitting the decisionmaking model. Thus, in all, we fitted three models.

Descriptive Model

The first approach uses indicator variables to measure the effect of each attribute. We fitted a probit equation to model the probability that the individual would choose to switch to the AHP. The probit uses the cumulative normal distribution function as the probability function, and our model is given by:[1]

$$\text{prob(switch to AHP)} = \Phi\,(X\beta),$$

where Φ is the standard normal cumulative distribution function, X includes characteristics of the individual and indicator (0,1) variables for the alternative levels of the attributions of the AHP (see Table 2.1), and β represents parameters to be estimated.

This model makes no assumptions about the form of the response to the plan features. However, it limits us to studying beneficiaries' choices when presented with AHPs that offer some combination of the benefit levels that we included in our hypothetical plan descriptions.

Decisionmaking Models

As an alternative to this descriptive model, we drew on economic theory about how individuals process and integrate information to choose among alternatives. By modeling how individuals integrate specific details into a set of summary outcomes and providing a decision rule, the decisionmaking model can let us generalize to many benefit packages that we have not studied, assuming that the model captures the process by which Medicare beneficiaries make choices.

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[1] The probit model is used rather than a linear model because the former constrains predicted probabilities to be between 0 and 1, while in the latter, predicted probabilities may fall outside this range.

The decision about what health plan to join is made under uncertainty. At the time of the choice, beneficiaries are uncertain as to whether they will be sick or well, and so they are uncertain about the financial consequences of choosing between health plans. The most widely used model of how people make decisions under uncertainty is the expected utility model. According to expected utility theory, individuals know the probability distribution of possible financial outcomes (or out-of-pocket health care costs), and they evaluate each choice or option by its expected utility, which is the product of the utility of the outcome and its corresponding probability. Individuals evaluate the expected gains and losses in out-of-pocket costs for each alternative plan and choose the option that maximizes expected utility.

In deciding whether to join an alternative delivery system, Medicare beneficiaries also weigh the financial consequences of the decision against restrictions on freedom to choose providers and other restrictions that the plan may impose to contain costs. We assume that utility is separable in financial outcomes and freedom of provider choice, and so we can write the expected utility of AHP plan j as:

$$EU_j = \Sigma_i p_i {}^* V_{ij} + D(\text{Restrictions}_j) \ , \tag{1}$$

where i indexes discrete health outcomes that occur with probability P_i, V denotes the utility associated with the financial outcomes of the plan choice, and D denotes the disutility or dissatisfaction resulting from the choice restrictions.

In specifying the utility function of Eq. (1), we follow Kahneman and Tversky (1979) and assume that the individuals evaluate gains and losses relative to a reference. Thus, we assume that beneficiaries evaluate the change in out-of-pocket expenditures for each outcome i for AHP plan j relative to their current Medicare coverage and weigh the expected utility of these changes against the disutility (or dissatisfaction) from giving up the free choice of providers under traditional Medicare coverage. The gain and loss for each outcome depends on the added benefits the AHP offers, and the additional cost (premium) of the AHP. The distribution of outcomes facing each individual is the simulated anticipated expenditure distribution described in the previous section.

MODEL ESTIMATION

Given the decisionmaking model (1), the probability that the beneficiary will choose to switch to the AHP rather than stay with the traditional Medicare plan is then given by

$$\text{prob(switch to AHP)} = \text{prob}(EU_j + w_j > 0) \ , \tag{2}$$

where w_j represents the influence of unobserved attributes on a beneficiary's utility from plan j.[2] Assuming that w is drawn from a normal distribution with mean 0 and variance s^2, the choice probability then becomes

$$\text{prob(switch to AHP)} = \Phi\{\beta * EU_j\} \ , \tag{3}$$

where Φ is the standard normal cumulative distribution function and $\beta = 1/s$.

For specific forms of EU_j, we assume that disutility of restricted choice is linear in the restrictions and characteristics of the individual. We hypothesized that those who are satisfied with their care would attach greater value to maintaining free choice of physicians and other providers and so included measures of patient satisfaction in function D of Eq. (1). We hypothesized that those in poor health (as measured by the expected health expenditure) might be less willing to give up their current provider attachments and so would have a greater disutility from restricted choice than beneficiaries in better health.[3]

The exponential is a commonly used form for the utility function in income, so adopting an exponential form for V, we assumed that the utility component in financial risk changes is represented by the **exponential utility model:**

$$V_{ij} = 1 - e^{-(a*n)}, \text{ if } n \geq 0 \text{ and} \tag{4}$$
$$- (1 - e^{a*n}), \text{ if } n < 0 \ ,$$

where n is the change in spending for health care (out-of-pocket spending for services and premium cost) and a is a parameter to be estimated. We also fitted an alternative specification in which expected utility from financial consequences is modeled as a function of expected gains and losses, by the **expected gain model:**

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[2] Since utility is defined relative to the current Medicare plan, this is equivalent to the statement that they choose the plan that yields the maximum expected utility.

[3] Ninety-one percent of our sample reported having a usual source of care and thus an established physician relationship.

$$\Sigma_i P_i V_{ij} = EV_{ij} = b^*E(\text{gain}) + c^*E(\text{loss}) + d^*E(\text{gain})^e + f^*E(\text{loss})^g \quad , \tag{5}$$

where E(gain) is the expected change in out-of-pocket payments for medical services and E(loss) is the premium cost.

Thus, we estimate three probit regressions: one for the descriptive model and two for the decisionmaking models just described. In the descriptive model, the financial consequences are represented by indicators for the benefits offered. In the two decisionmaking models, these are replaced by the utility functions in Eqs. (4) and (5). We refer to the model using Eq. (4) as the exponential utility model and to the model using Eq. (5) as the expected gain model. Parameter a in Eq. (4) and parameters e and g in Eq. (5) were obtained by repeated estimation of the probit model using a grid search over a or e and g.[4]

MODEL COMPARISONS

We compare the three models using several measures. The first is a *criterion* for choosing among competing models that was proposed by Akaike (1973) and is based on information theory. The other measures—net bias, sum of squared residuals, and Efron's R^2—*describe* the goodness of fit.

The Akaike Information Criterion (AIC) is given by $-l + K$, where l is the log likelihood and K is the number of estimated parameters. One chooses the model with the lower AIC.

The net bias (NB) and the sum of squared residuals (SSR) are descriptive measures of the bias and inaccuracy in the fit, respectively. They are given by

$$NB = (1/n)\,\Sigma(Y_i - P_i) \text{ and}$$

$$SSR = \Sigma(Y_i - P_i)^2 \quad ,$$

where Y_i is 1 if the individual indicated he or she would join the AHP and 0 otherwise, P_i is the predicted probability, and n is the number of observations.[5] We compare the NB and the SSR for the full data set, and also examine how frequently one model performs better than another in terms of NB and SSR using ten random samples of the observations.

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[4] The power transformations on expected loss, g, were not statistically significant.

[5] Amemiya (1981) provides a discussion of the AIC and SSR as criteria for choosing among models.

Efron (1978) suggests using SSR to develop an analogue of R^2 in standard regression models for the qualitative response model. Efron's measure is as follows:

$$\text{Efron's } R^2 = 1 - (SSR / \Sigma(Y_i - Y)^2) \ .$$

INTRAPERSON CORRELATION

Each respondent in our survey was presented with nine AHPs to evaluate. It is likely that a beneficiary who attaches greater (or lesser) than average utility to one AHP than other individuals with similar characteristics will also attach greater (or lesser) than average utility to other offers. That is, the w_j in Eq. (2) will be correlated across responses about different offers from a single individual. We correct the inference statistics for intraperson correlation using a nonparametric approach.[6]

WEIGHTING

Our sample does not represent Medicare beneficiaries, because we selected equal numbers of beneficiaries from strata of unequal size. Furthermore, as discussed in the previous section, there was differential nonresponse associated with demographic characteristics of beneficiaries. We assigned each stratum a weight that equals the ratio of the proportion of beneficiaries belonging to the stratum divided by the proportion of respondents in the stratum. When statistics are computed from the sample using this weight, they correspond to a simple random sample of beneficiaries.

There is debate, however, in the statistical literature about the use of sample weights in multivariate analysis (see DuMouchel and Duncan, 1983). We do not report weighted multivariate results for the estimates of the choice models. We did compare weighted and unweighted estimates as a means of checking for misspecifications of interactions. In predicting choices based on the estimated model, however, we used the weighted sample so that our predictions reflect the choices that the representative Medicare population would make.

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[6] The model for the adjustment is described by Brook et al. (1984), based on prior work by Huber (1967). The correction is similar to a random-effects model in which the error term is assumed to consist of an unobserved individual effect and a residual.

4. RESULTS

SUMMARY

This section presents the estimation results. We introduce this section with a brief overview of our major empirical results about the effect of plan characteristics on beneficiaries' decisions to enroll in AHPs.

We estimate that a 10-percent increase in the value of the benefit package an AHP offers will lead to a 5-percent increase in enrollment. Alternatively, a 5-percent increase in enrollment can be achieved by cutting premiums by only 8 percent. That is, demand is somewhat more responsive to changes in premium than to changes in the benefit package.

A catastrophic hospital benefit and a long-term care benefit are especially attractive to beneficaries. Controlling for the value of the additional benefit package, Medicare beneficiaries are more likely to enroll in a plan that offers additional benefits for these institutional expenses than a plan that offers additional ambulatory care benefits.

Beneficiaries do value the freedom to choose their primary provider, and the greater the restriction on this choice, the lower the likelihood of enrolling in the plan. Beneficiaries also favor the freedom to choose a hospital, even though patients are admitted to the hospital on the physician's referral. In contrast, beneficiaries do not appear to favor plans that allow them to refer themselves to specialists over managed-care plans.

A one-year enrollment requirement is a significant deterrent to enrolling in an AHP, unless out-of-plan use is at least partly reimbursed.

MODEL COMPARISONS

Our measures comparing the goodness-of-fit of the three models are shown in Table 4.1. Smaller values of the AIC, NB, and SSR indicate better fit; a large value of Efron's R^2 denotes better fit.

The descriptive model yields the lowest AIC and the smallest SSR, but the differences among the models are small. The descriptive model performs better in most of the random subgroups than either

Table 4.1

Comparison of Models

		Decisionmaking Models	
	Descriptive Model (A)	Expected Gain (B)	Exponential Utility (C)
AIC	2862	2922	2936
NB	-0.00	-0.00	-0.00
SSR	846.4	866.7	870.4
Efron's R^2	0.07	0.05	0.04
In ten random groups			
NB smaller than model A	—	3	3
SSR smaller than model A	—	0	1
NB smaller than model B	—	—	1
SSR smaller than model B	—	—	1

decisionmaking model. The model in which the expected utility is modeled as a function of expected gains and losses performs better than the model in which utility is an exponential function of the net gain.

We compare each model for goodness of fit by comparing how well each tracks the average probability as the probability varies. In Table 4.2, we sort the data by the predicted probability, split the sample into five groups of equal size, and tabulate the actual probability and the predicted probability for each model. The descriptive model tracks quite well, suggesting that we have not missed nonlinearities in the included characteristics. However, in the decisionmaking models, the difference between the actual and predicted probability shows some curvature; we overpredict at the low levels and underpredict at the high levels. The alternative utility functions that we have tested do not completely reflect beneficiaries' responses to various benefits.

To examine this further, we fitted a regression to explain the prediction error from the decisionmaking models for each individual. The explanatory variables were indicators for the enhanced benefits offered. In each case, the offer of long-term care benefits and the elimination of the hospital copayment for stays of more than 60 days

Table 4.2

Predicted and Actual Probabilities of Choosing AHP by Prediction Group

			Decisionmaking Model Predictions	
Prediction Order	Actual Probability	Descriptive Model Prediction	Expected Gain	Exponential Utility
Quintile				
Low	0.044	0.042	0.064	0.071
2	0.078	0.081	0.102	0.106
3	0.121	0.120	0.133	0.133
4	0.167	0.171	0.164	0.162
High	0.283	0.278	0.230	0.221

NOTE: Observations are grouped in prediction order from low to high using the descriptive model prediction. The results are unchanged using the predicted probability of the decisionmaking models.

was statistically significant and positive, indicating that beneficiaries value the reduction in these events that are rare, but that may have catastrophic financial consequences, more than we have been able to capture with the utility functions that we examined. That is, controlling for the value of the additional package of benefits, a plan that offers additional benefits for institutional expenses is more attractive than one that covers additional ambulatory care. Another explanation may be error in our imputation of the value of these added benefits. Recall that individual characteristics are not incorporated in our estimate of the value of eliminating the hospital copayment or adding a long-term-care benefit.

The result is also illustrated in Table 4.3, in which we compare the predicted response to changes in benefits based on the descriptive model and one of the decisionmaking models. Here, we look at only the model in which expected utility is a function of the expected value of the gains and losses, since this performed better than the exponential utility function. The largest difference between the two models is for the predicted change in enrollment for plans that add a long-term-care benefit or eliminate the copayments for lengthy hospital stays.

Table 4.3

Predicted Response to Change in Benefits (change in probability of joining AHP in percent)

Medicare Provision	Current[a]	Change to	Descriptive Model (%)	Decisionmaking Model: Expected Gains (%)
Hospital deductible	$540	$100	1.6	1.4
		$0	2.0	1.8
Hospital copayment[b]		0%	3.5	0.7
Physician deductible	$75	$0	0.5	0.8
Physician copayment	20%	10%	0.4	0.8
		0%	1.4	2.1
Drug copayment	100%	30%	1.4	2.2
		0%	2.2	2.8
Preventive care	100%	10%	0.6	1.8
		0%	0.9	1.9
Long-term-care copayment	100%	30%	3.1	1.5

[a] As of 1987.

[b] Currently, $135 a day for days 61 through 90; $270 a day from days 91 through 150 (reserve days); 100% for days over 150.

ESTIMATES

The parameter estimates for the descriptive model and for the preferred decisionmaking model are given in Tables 4.4 and 4.5.[1] The last column in each table uses the coefficient estimate to show the change in the probability of enrollment (the percentage point change) for a one-unit change in each of the explanatory variables.

Effects of Premium and Plan Benefits

As hypothesized, increases in premiums decrease the likelihood of AHP enrollment, and increases in the generosity of the benefit package increase enrollment. The elasticity of enrollment with respect to changes in price is –0.75 in the descriptive model and –0.61 in the

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[1] The major difference among all of the models is in the coefficients on the financial consequences. In the decisionmaking model with an exponential utility function, the parameter a of Eq. (4) in Sec. 3 was 0.00003.

Table 4.4

Probit Regression for Descriptive Model of AHP Choice

	Parameter Estimate	Standard Error	t-Stat	dProb/dX (%)
Plan characteristics				
Premium (all beneficiaries)	−0.00101	0.00012	−8.61	−0.0099
Premium if high income (0 else)	0.00031	0.00014	2.18	0.0030
Added benefits[a]				
Hospital deductible				
$100	0.16374	0.04085	4.01	1.5929
$0	0.20565	0.04138	4.97	2.0006
0% copay after 60+ hosp days	0.35502	0.03475	10.22	3.4536
Long term care copay 30%	0.32195	0.04059	7.93	3.1319
$0 physician deductible	0.04876	0.03084	1.58	0.4744
Physician copayment				
10%	0.04508	0.04155	1.08	0.4385
0%	0.14139	0.04455	3.17	1.3754
Preventive coverage				
10% copayment	0.05675	0.03813	1.49	0.5520
0% copayment	0.08810	0.03826	2.30	0.8570
Prescription drug coverage				
30% copay	0.14060	0.04007	3.51	1.3678
0% copay	0.23104	0.04114	5.62	2.2476
Physician and hospital choices[a]				
No hospital restriction and				
Large panel of doctors	−0.28986	0.05928	−4.89	−2.8198
Small panel of doctors	−0.37455	0.06603	−5.67	−3.6436
Doctors at plan facility	−0.29670	0.06354	−4.67	−2.8863
Hospital restriction and				
Large panel of doctors	−0.38127	0.06392	−5.96	−3.7090
Small panel of doctors	−0.58977	0.06498	−9.08	−5.7373
Doctors at plan facility	−0.51446	0.06636	−7.75	−5.0047
Doctors at facility include own physician	−0.23809	0.06176	−3.86	−2.3161
Case management—cannot self-refer	−0.03870	0.03048	−1.27	−0.3765
Enrollment term and out-of-plan coverage				
one year, no out-of-plan	−0.10302	0.04954	−2.08	−1.0022
one year, out-of-plan	−0.04147	0.04228	−0.98	−0.4034
30 day, no out-of-plan	0.01388	0.04872	0.28	0.1350
Individual characteristics				
Log income	0.00476	0.04252	0.11	0.0463
Age				
70–74	−0.15989	0.08794	−1.82	−1.5554
75–79	−0.10273	0.09151	−1.12	−0.9994
≥ 80	−0.04074	0.09397	−0.43	−0.3963

Table 4.4—continued

	Parameter Estimate	Standard Error	t-Stat	dProb/dX (%)
Medigap coverage				
Has Medigap	0.38236	0.36070	1.06	3.7196
Log premium if have	–0.05680	0.05605	–1.01	–0.5525
Expected financial risk[b]	–0.00004	0.00019	–0.21	–0.0004
Std. dev. of financial risk[c]	0.00005	0.00010	0.45	0.0005
Patient attitudes				
General satisfaction	–0.02162	0.05547	–0.39	–0.2103
Financial aspect	–0.19170	0.05002	–3.83	–1.8649
Covered by Medicaid	–0.04387	0.09666	–0.45	–0.4268
AHP Medicare share				
Medium	–0.10080	0.08094	–1.25	–0.9806
High	–0.01820	0.08089	–0.22	–0.1770
Black	–0.26788	0.13440	–1.99	–2.6059
Male	0.12167	0.06985	1.74	1.1836
Intercept	–0.78724	0.43720	–1.80	

NOTE: Omitted indicators are current Medicare benefit coverage, no hospital restriction, own physician at plan facility; 30 day enrollment, out-of-plan use covered; age 65–69; low AHP share of local Medicare market.

dProb/dX is evaluated at the mean of demographic characteristics, assumes a plan that provides full hospital and physician coverage at actuarial cost, a large panel of providers with hospital restriction, one-year enrollment with out-of-plan coverage, and no case management.

[a] Indicator equals 1 if the plan has the characteristic, 0 otherwise. A "large" panel of doctors includes about half of the doctors in the individual area, a "small" panel includes 10 percent of the doctors.

[b] Expected patient cost-sharing given current Medicare provisions based on the imputed distribution of health expenditures for the individual.

[c] The standard deviation of patient cost-sharing from the imputed distribution of health expenditures for the individual.

decisionmaking model.[2] That is, based on the descriptive model, we predict that a 10-percent decrease in premium will result in a 6 to 7.5 percent (not percentage point) increase in enrollment, depending on the model assumed. This response is very similar to estimates of the price elasticity of enrollment from responses to hypothetical insurance offers presented to a nonaged population and from observed demand for private supplementary insurance by Medicare beneficiaries (see Marquis, Kanouse, and Brodsley, 1985; Long and Settle, 1982).

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[2] The elasticity of enrollment with respect to price is the percentage change in enrollment in response to a percentage change in price. The elasticities are calculated for the reference plan and reference individual described in the footnotes of Tables 4.4 and 4.5.

Table 4.5

Probit Regression for Decisionmaking Model of AHP Choice Using Expected Gain Utility Function[a]

	Parameter Estimate	Standard Error	t-Stat	dProb/dX (%)
Utility of gains and losses				
Premium (all beneficiaries)	−0.00080	0.00010	−7.62	−0.0070
Premium if high income (0 else)	0.00035	0.00014	2.46	0.0030
Value of added benefit[b]	−0.00060	0.00033	−1.81	0.0052
(Value of benefit)$^{0.75}$ [c]	0.00742	0.00259	2.86	0.0652
Disutility of restricted choice				
Physician and hospital choices[d]				
No hospital restriction and				
Large panel of doctors	−0.28226	0.05837	−4.84	−2.4782
Small panel of doctors	−0.38445	0.06608	−5.82	−3.3755
Doctor at plan facility	−0.29624	0.06368	−4.65	−2.6010
Hospital restriction and				
Large panel of doctors	−0.37768	0.06308	−5.99	−3.3160
Small panel of doctors	−0.59184	0.06363	−9.30	−5.1964
Doctors at plan facility	−0.52117	0.06527	−7.98	−4.5759
Doctors at facility include own physician	−0.23472	0.06080	−3.86	−2.0608
Case management—cannot self-refer	−0.03483	0.02993	−1.16	−0.3058
Enrollment term and out-of-plan coverage				
one year, no out-of-plan	−0.11085	0.04910	−2.26	−0.9733
one year, out-of-plan	−0.03449	0.04179	−0.83	−0.3028
30 day, no out-of-plan	0.00516	0.04812	0.11	0.0453
Individual characteristics				
Log income	−0.00365	0.04105	−0.09	−0.0321
Age				
70–74	−0.16690	0.08561	−1.95	−1.4654
75–79	−0.11016	0.08899	−1.24	−0.9672
≥ 80	−0.04677	0.09229	−0.51	−0.4106
Medigap coverage				
Has Medigap	0.42214	0.35180	1.20	3.7064
Log premium if have	−0.06454	0.05474	−1.18	−0.5666
Expected risk[e]	−0.00034	0.00020	−1.67	−0.0029
Std. dev. of risk[f]	0.00009	0.00010	0.88	0.0009
Patient attitudes				
General satisfaction	−0.01749	0.05423	−0.32	−0.1535
Financial aspects	−0.18482	0.04902	−3.77	−1.6227
Covered by Medicaid	−0.06029	0.09488	−0.64	−0.5293

Table 4.5—continued

	Parameter Estimate	Standard Error	t-Stat	dProb/dX (%)
AHP Medicare share				
Medium	−0.09207	0.07882	−1.17	−0.8084
High	−0.01688	0.07879	−0.21	−0.1482
Black	−0.26770	0.13120	−2.04	−2.3504
Male	0.11615	0.06815	1.70	1.0198
Intercept	−0.27237	0.42660	−0.64	—

NOTE: Omitted indicators are: no hospital restriction, own physician at plan facility; 30 day enrollment, out-of-plan use covered; age 65–69; low AHP share of local Medicare market.

dProb/dX is evaluated at the mean of demographic characteristics, assumes a plan that provides full hospital and physician coverage at actuarial cost, large panel of providers with hospital restriction, one year enrollment with out-of-plan coverage, no case management.

[a] See Eq. (3) in Sec. 3. A grid search over a power transformation of premiums did not yield a significant result, and so the power transformation is not included.

[b] Based on the imputed distribution of expected health expenditures for the individual.

[c] The power transformation 0.75 was found by a grid search over the general model given in Eq. (5) in Sec. 3.

[d] A "large" panel of doctors includes about half of the doctors in the individual's area; a small panel includes 10 percent of the doctors.

[e] Expected patient cost-sharing given current Medicare provisions based on the imputed distribution of health expenditures for the individual.

[f] The standard deviation of patient cost-sharing from the imputed distribution of health expenditures for the individual.

The elasticity with respect to changes in the value of the benefit package is smaller in absolute value than the price elasticity; the estimate from the decisionmaking model of the elasticity with respect to gains is +0.52; a 10-percent increase in the value of the benefit package will increase AHP enrollment 5 percent.[3] That is, demand is more responsive to changes in premium cost than to increases in the expected value of the benefit package. This result is illustrated in Fig 4.1, which contrasts changes in purchase probabilities as we vary the expected value of the gains from the enhanced benefits from enrolling in a plan with change as we vary the premium cost of the plan. To

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[3] The value of the added benefit enters the expected gain model directly and with a power transformation (see Table 4.5); both coefficients enter the calculation of the effect of a change in the value of benefits on the probability of enrollment. This change in probability is given by

$$\frac{\delta \text{Prob}}{\delta \text{value of Benefit}} = \phi(X\beta)\,(0.00742 \text{ Value of Benefit}^{-0.25} - 0.00060)\,,$$

where ϕ is the standard normal density.

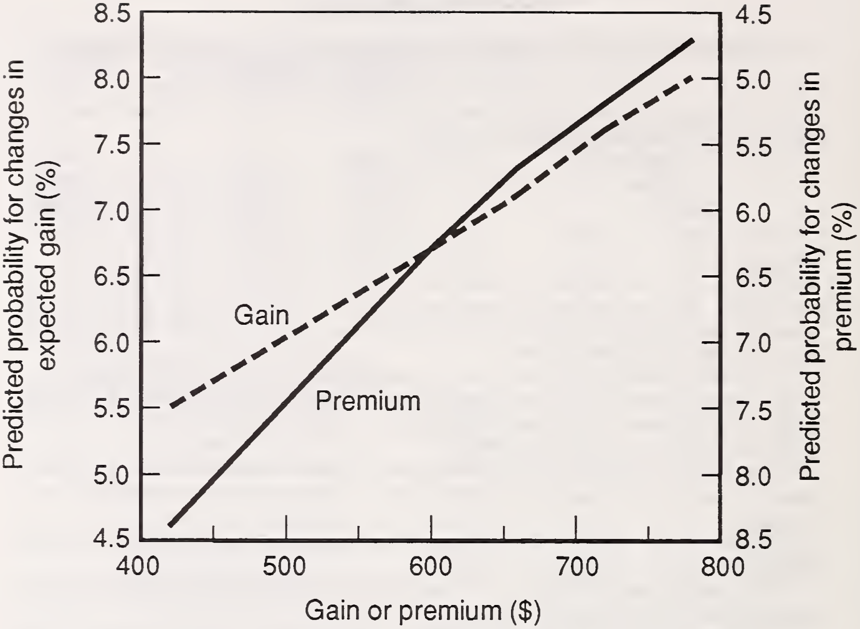

Fig. 4.1—Predicted probabilities as expected gain and premium vary

contrast the response more easily, we have reversed the y-axis for the premium probabilities so that movements up the y-axis show a decrease in purchase probabilities. Demand is more responsive to premium changes than to changes in the expected gain (the slope of the line is steeper for premium changes).

This result has been found in other work (see Marquis and Holmer, 1986; Manning and Marquis, 1989). The finding supports a hypothesis advanced by Kahneman and Tversky (1979) in presenting their "prospect" theory of decisionmaking under uncertainty—namely, that losses loom larger than gains. In the hypothetical AHPs, losses were the added premium they would have to pay to join the AHP and receive the expanded benefits, and gains were the value of the added benefits.

Our finding, however, is also compatible with Kahneman and Tversky's premise that uncertain financial consequences have a smaller effect than certain outcomes. In our data, premiums are certain consequences, whereas added benefits are the uncertain consequences; enrollment behavior changes more in response to changes in the former than the latter.

This result holds only for beneficiaries with below-average reported income. The total response to premium for high-income beneficiaries is given by the sum of the coefficient of the premium for all beneficiaries and the interaction between the premium and high income (the row labeled "Premium if high income" in Tables 4.4 and 4.5). We found a significant and negative coefficient on the *interaction* between premiums and high income. This means that higher income beneficiaries are less responsive to price changes. For beneficiaries with incomes above average, the estimated price elasticity from the behavioral model is -0.35; in contrast, the estimate is -0.61 for lower income beneficiaries. We did not, however, find a statistically significant interaction between income and the response to added benefits. The price elasticity of demand for higher income beneficiaries is not greater, in absolute value, than the response to expected gains.

Effect of Plan Restrictions

Beneficiaries do value free choice of provider as seen by the statistically significant effects of the provider restrictions (see t-statistics for "Physician and hospital choices" in Tables 4.4 and 4.5). Viewed as least restrictive is a requirement to go to specific plan facilities for physician care *if* the beneficiary's provider practices at the location. A small network of doctors is less attractive than a similar-size physician panel that practices in a central location. A plan that offers a large panel of providers is more attractive than one that offers a small panel.

Plans that require the patient to use certain hospitals are less attractive than plans that let the patient and provider choose any hospital in the area. Restricted hospital choice reduces the likelihood of enrollment by about 2 percentage points.[4] This effect, however, is smaller if the physician panel is large than if it is small. The effect of hospital restriction is somewhat surprising, since patients are admitted to the hospital on the physician's referral, and physicians have admitting privileges at a limited number of hospitals. Nonetheless, it is consistent with other surveys of Medicare beneficiaries' preferences for features of their coverage (Friedman et al., 1984). Surveys have also shown that individuals have specific hospital preferences and that almost 41 percent of individuals would question it if the physician recommended a different hospital. The elderly, however, were less likely to indicate that they would question the physician's recommendation. (See Marquis et al., 1985, for a review of these studies.) So, hospital choice does appear to be a valued attribute.

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[4] The effect of restricted hospital choice for a plan that requires the patient to visit physicians at a central facility is given in the last column of the row labeled "Doctors at Facility include own physician," Tables 4.4 and 4.5. The effect of adding a hospital restriction for other types of physician panel is the difference between the dProb/dx shown for the panel with and without the restriction.

In view of the hospital result, it is surprising that we did not find that beneficiaries favored plans that allowed them to refer themselves to physicians over plans that adopt a managed-care policy and require the primary-care physician to refer the patient (see row labeled "Case management—cannot self-refer," Tables 4.4 and 4.5). Perhaps the cost of acquiring information about the many specialists in an area is greater than the cost of acquiring information about several hospitals, and so patients expect to rely on their primary-care provider for referrals to other doctors. The case management restriction did not have a statistically significant effect overall, nor did we find that the effect interacted with the type of primary-care physician panel, or with the length of the enrollment period.

Plans that require a full one-year enrollment period and do not reimburse for any out-of-plan use are significantly less attractive to beneficiaries than plans that have shorter enrollment or that provide at least some reimbursement if the patient goes to providers other than those participating in the plan (see results for "Enrollment term and out-of-plan coverage," Tables 4.4 and 4.5). One-year enrollment is not a deterrent to joining the plan if the beneficiary can continue to use out-of-plan providers with some reimbursement. Locking the beneficiary into using plan providers is not a deterrent to joining the plan provided that the beneficiary can disenroll with 30 days notice.

Effects of Other Characteristics

As we hypothesized, beneficiaries who are satisfied with the financial aspects of their current coverage are less likely to join an AHP than those who are dissatisfied. General satisfaction with current care, however, does not appear to weigh in the decision about AHPs.[5]

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[5] Both measures are based on the average response to a series of questionnaire items; each scale has a possible range of 1 to 5.

The expected value of the out-of-pocket expenditures for medical care the individual faces given current Medicare coverage was included as a measure of expected risk or current health status.[6] We hypothesized that those in poorer health might be less likely to join an AHP because it would require switching doctors and disrupting the continuity of care. Furthermore, a number of studies of the elderly have found evidence of favorable[7] selection among the elderly, at least in HMOs (see Hellinger, 1987, for a review of this literature). The decisionmaking model shows a significant (one-tailed test) decrease in the likelihood of joining an AHP among those with high expected out-of-pocket risks, other things being equal. However, this cannot be taken as an answer to the question of biased selection, because the value of enhanced benefits, which increases the enrollment probability, also increases as the out-of-pocket risk increases. We will return to the question of adverse selection in the next section.

Assuming insurance to be a normal good, demand for insurance would increase with income. Hence, we might expect higher income beneficiaries to be more likely to enroll in AHPs with their expanded coverage. On the other hand, low-income individuals, who are most vulnerable to out-of-pocket medical costs, might be willing to give up free choice of provider for the protection against out-of-pocket costs. Hence, a priori, the effect of income is uncertain. We did not obtain a statistically significant income effect (Tables 4.4 and 4.5). However, our measure is self-reported total income in the previous year. It is possible that error of measurement—due to response errors and the use of last year's total income rather than permanent income—may have biased our estimate toward zero.

The level of AHP enrollment in the individual's residence area was included as a proxy for awareness and understanding of AHP options. We hypothesized that beneficiaries who are familiar with AHPs would be more receptive to them. We did obtain a statistically significant effect for this variable. However, our measure is an imperfect proxy for the true measure of beneficiary knowledge about AHPs and so might understate the role of this construct.

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[6] This expected risk was estimated using the imputed health expenditure distribution.

[7] Favorable selection in HMOs occurs if beneficiaries enrolling in HMOs are healthier than those staying with the traditional plan. Adverse selection occurs if beneficaries enrolling in HMOs are less healthy than those in the traditional plan.

Interactions

Because of our low response rate, and because we did find different response rates among subgroups, we tested for a number of interactions among demographic characteristics and attributes of the plan. Except for the interaction between price and income mentioned earlier, we found no significant interactions between beneficiary characteristics and plan attributes. There was no interaction between health status or knowledge about AHPs (using AHPs' share of the local Medicare market as a proxy) and premium, the degree of physician restriction, whether self-referral is permitted, or the type of added benefits. The response to the benefits offered, the degree of physician restriction, and case-management policy did not vary between low- and high-income beneficiaries.

We also tested for differences between those in the phone stratum and those in the no-phone stratum in the response to the type of benefits offered, physician restrictions, case-management policy, and premium. The no-phone respondents did not show a different response than phone respondents with the same characteristics. We concluded that there are no important unmeasured differences between the groups that could lead us to biased conclusions because we did not sample from all strata for which we could not obtain phone numbers.

Finally, we mentioned above the interactions between hospital and physician restriction and between enrollment period and out-of-plan coverage. We did not, however, find that the effects of case-management policy, the required enrollment period, or whether out-of-plan use is covered on the likelihood of enrollment differed according to the size and type of physician panel offered.

5. APPLICATIONS

This section illustrates the use of our model to address a number of questions. We estimated the dollar value to beneficiaries of freedom of provider choice in their Medicare coverage, enrollment shares for several plans that are similar to plans that were included in the HCFA capitation demonstrations, biased selection in typical plans, demand premiums for insurance by beneficiaries, and the demand for catastrophic benefits. To make some of these estimates, we used the estimated parameters given in the previous section to *predict* the probability that a beneficiary of given characteristics would join a plan of specified characteristics.[1] For other estimates, we used the parameters to estimate how large a change in an attribute would be needed to increase the probability of enrollment to a specified level. Details are given within each discussion.

VALUE OF FREE CHOICE OF PROVIDER

We estimated the value that beneficiaries attach to freedom of choice of provider as the amount of money that would leave the beneficiary indifferent between staying in the traditional plan without the money and enrolling in the AHP that offered the same set of benefits (no enhanced benefits). To do this, we first had to characterize the AHP option in terms of the attributes we studied using the hypothetical offers. We examined five types of AHPs. The types and the way in which we characterized these types in terms of provider restrictions, case management policy, out-of-plan coverage, and enrollment term are in Table 5.1.

A beneficiary is indifferent between the AHP and the fee-for-service plan when he or she is equally likely to join the AHP or stay with the current Medicare coverage. Thus, we calculate the value of freedom of choice, or the disutility "cost" of restricting one's choice, as the (negative) premium at which the probability of selecting the plan is 50 percent. Our estimates are for a typical individual, one with average characteristics.

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[1] We use the decisionmaking model for all analyses because it lets us make estimates for plan benefits that we did not include in our hypothetical offers.

Table 5.1

Characterization of Plans

	Physician Restriction	Hospital Restriction	Case Management	Out-of-Plan Use Covered	Length of Enrollment
HMO	Doctor at facility	Yes	Yes	No	1 year
Independent Practice Association (IPA)	Small panel of doctors	Yes	No	No	1 year
Small PPO	Small panel of doctors	Yes	No	Yes	1 year
Large PPO	Large panel of doctors	Yes	No	Yes	1 year
Small physician-only PPO	Small panel of doctors	No	No	Yes	1 year

An alternative way to view this estimate is that it is the money that would need to be offered to attract 50 percent of "typical" beneficiaries to enroll in an AHP. Similar individuals are not all alike in their attitudes or in the disutility that they experience by giving up freedom of provider choice. So, we have also calculated the money needed to attract 10 percent of our "typical" beneficiaries to the AHP, and that needed to attract 25 percent. The results are shown in Table 5.2. The last column is a t-test of the difference in the disutility of restrictions imposed by other types of AHPs relative to the HMO. A negative t-value indicates that the "cost" of joining the indicated plan is less than the "cost" of joining an HMO. A t-value of greater than 2.0 (absolute value) indicates that the difference in "costs" is statistically significant ($p = 0.05$).

The estimated value of retaining free choice (measured at a probability of 50 percent) varies between $1950 and $2300 annually, depending on the kind of restrictions that the AHP imposes. PPOs that include a large panel of providers and small PPOs that do not restrict patient choice of hospital have lower disutility costs of restricted choice than the other types we investigate.

In calculating the value of free choice, we used the premium coefficient rather than the benefit coefficient. Premiums and benefits differ in two ways in our data. Premiums are certain, while the financial value of the added benefits is uncertain. However, premiums are also losses,

Table 5.2

Value of Freedom of Choice: Money Needed to Make Beneficiary Indifferent Between AHPs and Traditional Medicare

($)

Restricted Type Plan	10%	25%	50%	t vs. HMO
HMO	671	1437	2276	—
IPA	716	1481	2321	0.51
Small PPO	620	1385	2225	–0.48
Large PPO	351	1117	1957	–2.81
Small physician-only PPO	360	1125	1965	–2.80

and benefits are gains. As we noted earlier, our data do not allow us to determine whether the difference in response to benefit provisions and premiums reflects a certainty effect or differences in the values of gains and losses. If the certainty effect predominates, then we should use the premium coefficient to make the calculation in Table 5.2—as we did. If positive and negative financial outcomes are valued differently irrespective of certainty, then we should use the value of the added benefit coefficient to make the calculations in Table 5.2. This would result in even larger estimates of the value of free choice. For example, the money needed to attract 25 percent of beneficiaries to a large PPO would be $1500, rather than the $1117 figure given.

PREDICTED ENROLLMENT SHARES IN DEMONSTRATION SITES

Between 1982 and early 1985, 27 HMOs and competitive medical plans entered the Medicare market under the Medicare competition demonstration program. The status and experience of those plans in 1984 was reported by Langwell et al. (1987). We used our choice model to predict what share of beneficiaries would elect enrollment in the AHP plans offered in those sites and compared the prediction with actual experience in the sites. We limited this comparison to three sites in which the plan or plans had begun enrolling Medicare beneficiaries at least by the year prior to the evaluation; we did not make predictions for sites in which the plans had less than a full year of experience in the demonstration.

We described the plan in terms of plan type, premiums (1987 dollars), and benefits based on data reported by Langwell et al. (1987). Our descriptions are shown in Table 5.3. In the Miami, Florida, area several AHPs participated in the demonstration, and we used an average value of the premiums and benefits to represent the plan offered.[2] In making predictions of enrollment using the choice model, the type of plan—IPA or HMO—was described using the combinations of restrictions, case management policy, and out-of-plan coverage that we used earlier to represent these different types (see Table 5.1). However, disenrollment with 30 days notice was assumed for all plans as this is a requirement for Medicare participation.

To value the benefits that the plan offered, we used the expected expenditures for our sample persons, as described earlier. Vision and hearing benefits were also valued using expected expenditures reported in the survey. We did not, however, collect data about anticipated dental expenditures in the survey. We valued the dental benefit offered in the Miami, Florida, site using data about average

Table 5.3

Characterization of AHP Plan for Selected Medicare Competition Demonstrations

Plan Characteristics	Miami, Florida	Flint, Michigan	Rochester, New York
Type of plan	IPA	IPA	HMO
Annual premium	$100	$680	$220
Benefits, patient cost-sharing (%)			
Hospital	0	0	0
Physician	0	10	10
Preventive	0	10	10
Prescription drug	10	0	50
Hearing	60	100	10
Vision	25	0	10
Dental	20	100	100

---

[2] Dollar charges by the plan were translated into coinsurance rates using data we reported in Table 2.3. Dental coinsurance is calculated as the share of plans offering dental benefits.

annual dental expenditures for the aged from 1977 National Medical Care Expenditure Survey (Rossiter, 1982).

We predicted the likelihood of enrolling in each plan for our sample persons and calculated predicted enrollment as the weighted average of the individual predictions.[3] Our predicted enrollment is compared in Table 5.4 with actual Medicare AHP enrollment in the selected sites. These comparisons are intended to give a benchmark for assessing the validity of our model predictions. Enrollments in AHPs are affected by factors that we do not measure, such as AHP marketing efforts, location, reputation. Our objective was not to predict how actual AHPs might fare, but rather to predict how changes in variables that are subject to policy change might alter the potential for AHPs to capture a larger share of the Medicare market. Our predictions for specific sites also do not take into account the difference between the demographic compositions of the site and our sample, which is weighted to represent the nation.

Given these cautions, we believe that the results of the comparisons do suggest that the survey responses to the hypothetical offers reflect how beneficiaries evaluate the AHP option. Our predictions and actual AHP enrollments are quite similar in two of the sites. However, based on the benefits offered, the premium, and the type of plan, the model would predict that an AHP similar to the Rochester, New York, demonstration site has the potential to capture a much larger share of the Medicare market than the plan gained—at least in its early experience with enrolling Medicare beneficiaries. While we do not have enough detail about the different demonstration sites to

Table 5.4

Model Predictions and Medicare AHP Enrollments in Selected Demonstration Sites

	Miami, Florida	Flint, Michigan	Rochester, New York
Model prediction of enrollment	14.2	6.5	12.9
AHP Medicare market share, 1984	13.6	8.7	4.0

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[3] Using the weights described earlier to yield estimates representing the Medicare population.

explain this result, the difference between actual and predicted enrollment may suggest that local factors—such as marketing and AHP location—play an important role in enrollment.

BIASED SELECTION

Whether HMOs and other AHPs experience favorable or adverse selection is a question that has received a great deal of research attention. Answers to the question are important for designing Medicare AHP policy. The research has not produced completely consistent results. Beneficiaries who have low levels of prior use appear to be more likely to join HMOs, though this result is not found in IPAs (Hellinger, 1987). Analyses based on prior health-care use may not produce the same conclusions as analyses based on health status, since low use may reflect poor access and patient preferences rather than good health. Indeed, health-status measures do not produce the same finding of favorable selection, even in HMOs.

As we noted in the previous section, the estimated coefficient on expected future health risks in the decisionmaking model was negative and statistically significant. This suggests that, all other things being equal, beneficiaries with high expected health risks were less likely to be interested in AHP enrollment. The expected value of any fixed benefit package is greater for those anticipating high future health losses than for those who expect to stay healthy. Since the value of the benefit package also has a statistically significant effect on the likelihood of enrollment, a true picture of selection includes both the direct effect of expected future health risks on enrollment and the indirect effect stemming from the change in the value of the benefit package. However, we can only artificially control for differences in the value of the benefit package among people with different health risks.

These results are shown in Figs. 5.1 to 5.3. In each figure, we present "net effects"—the effects of health status, controlling for other beneficiary characteristics, such as income and beneficiary attitudes—and "gross effects"—differences by health status, allowing these other characteristics to vary. Net effects indicate whether health status is a factor in the preference. The gross effects show whether those joining the AHP are likely to be healthier or sicker, irrespective of whether it is a result of the influence of health status or some other factor that varies with both health status and AHP preference. Figure 5.1 compares the results for subgroups of

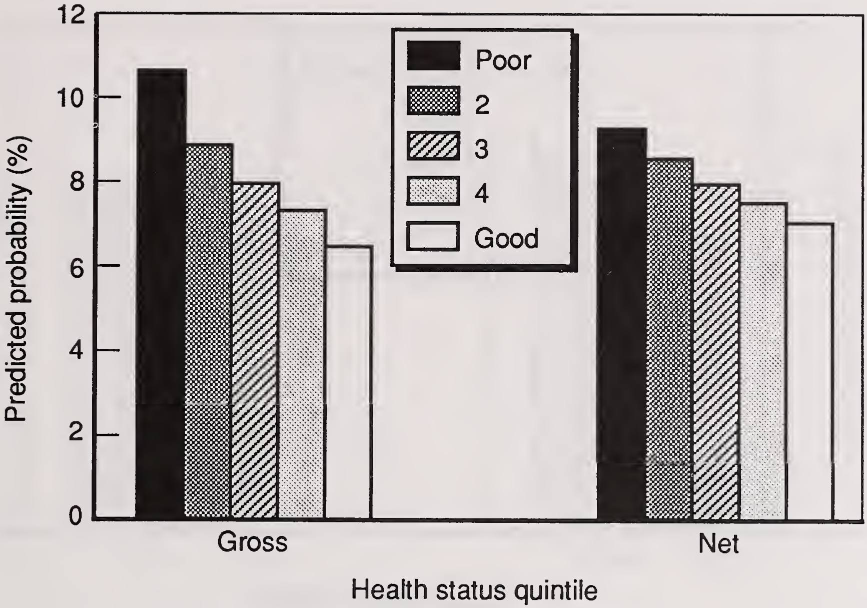

Fig. 5.1—Gross and net effects of reported health status

beneficiaries who differ in self-reported future health status. Figure 5.2 compares beneficiaries who differ in their anticipated level of spending in the next year. Figure 5.3 uses expenditures in the previous calendar year (as measured from the MADRS) to define subgroups of beneficiaries.[4]

Our results show evidence of adverse selection (in terms of patient preferences). We find a statistically significant higher probability of selecting an AHP option among those anticipating poor health (Fig. 5.1) or high expenditures (Fig. 5.2) than those expecting to be healthy or to have low levels of medical spending. The result obtains for both the net effects and gross effects, though the magnitude of the effect is larger when looking at gross effects, indicating that there are other variables that are related to both health perceptions and AHP preferences.

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[4] Because our fitted models did not contain statistically significant interactions between demographic characteristics of beneficiaries and plan characteristics, predicted selection results do not vary by type of AHP.

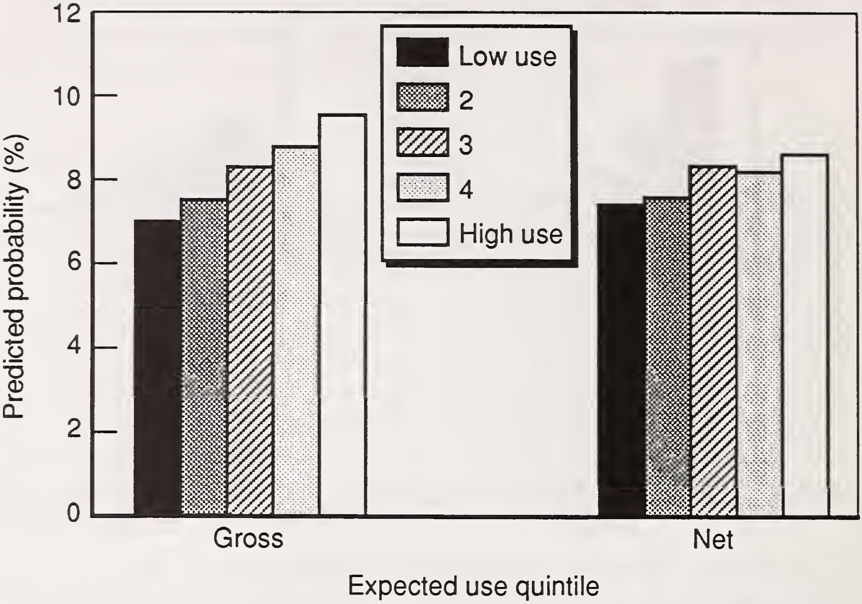

Fig. 5.2—Gross and net effects of reported anticipated use next year

Measuring selection effects (Fig. 5.3) via prior use, however, does not yield such clear results. The net effects show a tendency for those with high prior use to be more likely to prefer an AHP. But the gross effects are mixed; those at the extremes, with lowest prior use and highest prior use, are most likely to prefer an AHP. Differences in preferences among individuals with differing levels of prior use may not adequately capture selection effects; while studies show that use is correlated over time, others have found evidence of substantial regression to the mean. Our results suggest that beneficiaries make decisions based on their expected future health needs. To the extent that they can adequately forecast these needs, our findings also give evidence of the potential for adverse selection into AHPs.

Selection can be the result of both beneficiary preferences and of plan marketing. Indeed, a recent evaluation of an HCFA-sponsored demonstration project suggested that favorable selection is substantially reduced if the HMO's capitation payments are adjusted for prior use of enrollees, thus reducing the HMO's incentive to target marketing efforts to attract only healthy Medicare beneficiaries (Porell and Turner, 1990). Our choice models provide us with evidence as to

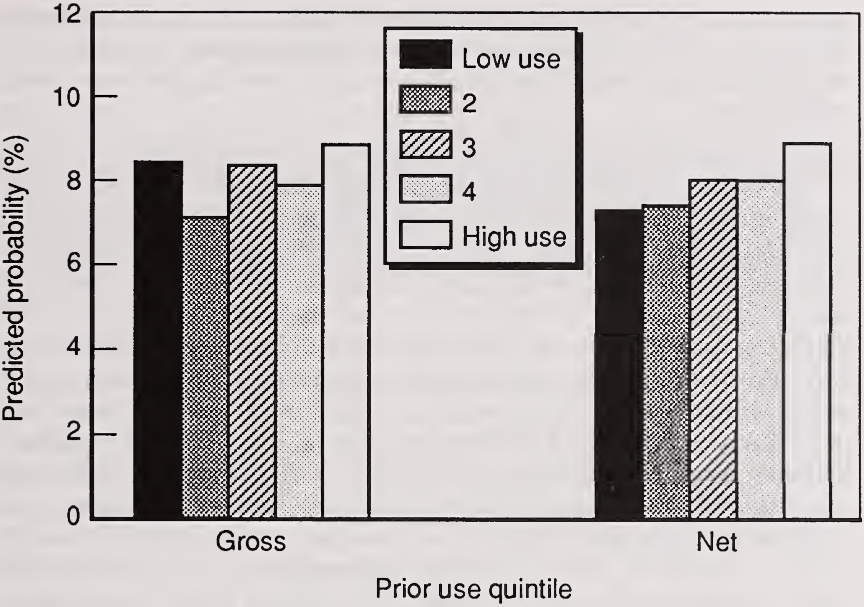

Fig. 5.3—Gross and net effects of prior actual use

whether preferences for AHPs differ according to beneficiary health. Some plans may still experience favorable selection depending on factors that we cannot control.

DEMAND PREMIUMS

We used our decisionmaking model to calculate demand premiums for new benefits—the premium level that would leave the beneficiary indifferent between having the added benefits at that premium and not having the added coverage. Demand premiums measure the maximum premium an individual is willing to pay for a new insurance benefit. When the demand premium exceeds the actuarial value of the benefit, it indicates that the beneficiary is averse to risk and is willing to pay to reduce risk. The difference between the demand premium and the actuarial value of the benefit is a measure of the value of risk reduction.

Demand premiums are estimated by finding the premium at which the probability of purchasing a plan with the added benefits just equals the probability of purchasing a plan without the benefits. Because we did not find interactions between plan types and the response to premium or benefits, the results do not apply to a specific type of plan.

Demand premiums for selected levels of expanded benefits are shown in Table 5.5. Marquis and Holmer (1986) estimated a demand premium of $634 for a young family for additional benefits worth $500 per family; and Manning and Marquis (1989) estimated a demand premium of $590 for a young family for additional benefits of $400 per family. These are quite similar to the estimates that we obtained for Medicare beneficiaries for added benefits of $400 and $500 (Table 5.5). However, the demand premiums estimated for lower levels of added benefits in Manning and Marquis (1989) are much lower than the estimates in Table 5.5. Our estimates of the demand premium, however, are sensitive to the form of the utility function in gains and losses and the parameters that we estimated. The utility function we used is only marginally better than the exponential function. In addition, the likelihood for the function that we used is fairly flat in the power transformation on the gains. The implied demand premiums, however, are quite different with different model specifications. However, the predicted probabilities of enrollment in AHPs are much less sensitive to changes in the specification.

DEMAND FOR CATASTROPHIC BENEFITS

Finally, we used the model to investigate what Medicare beneficiaries would have been willing to pay for the catastrophic coverage that was enacted in the Medicare Catastrophic Health Insurance law in 1988 and repealed only a year later. We also use the model to predict what

Table 5.5

Demand Premiums per Year ($)

Value of Added Benefit	Demand Premium
200	357
300	450
400	545
500	622

share of Medicare beneficiaries would buy the protection at the premium that the law would have required they pay. We assume the benefits that would have been in place in 1993 when the prescription drug coverage was to have been fully phased in. Our estimate of the average expected value of the elimination of the hospital coinsurance, the catastrophic cap on out-of-pocket expenditures for Part B services, and the drug premium is $312 (1987 dollars) based on the expected distribution of risks reported in our survey.[5] Our estimate of the average demand premium for those new benefits is $550 (1987 dollars).

Most beneficiaries would have been required to pay less than this amount, but some would have paid considerably more. To predict who would and would not buy the catastrophic coverage if offered the coverage at the premium they would have to pay, we simulated a choice between plans with and without catastrophic benefits. An individual will choose a plan with catastrophic benefits if it yields greater expected utility than the plan without benefits. From Sec. 2, the individual will choose the catastrophic plan if

$$X_c * \beta + w_c > X_n * \beta + w_n \ ,$$

where $X_c * \beta$ is the prediction from the probit for a plan with catastrophic benefits and premium, $X_n * \beta$ is the prediction for an otherwise similar plan without the benefit, and the w_c and w_n are the stochastic components of utility drawn from the normal distribution.[6] The value to each individual of the catastrophic benefits uses the individual's risk distribution. Premiums that each individual would pay were calculated using the three new types of premiums that would have been required by the law.[7] One component of the premium depends on the tax liability and is a family premium for a married couple. We assigned half of this amount to the individual in question.

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[5] The U.S. General Accounting Office (1989) analysis of the catastrophic legislation suggests that benefits for these components would average $350 per beneficiary in 1993. Assuming inflation of 6 percent per year, this is $250 per beneficiary in 1987 dollars.

[6] As noted in Sec. 3, the stochastic term consists of an individual specific component that is common to the evaluation of all plans and a random component that varies across plans. The intraperson correlation is 0.3. To account for this correlation in the w in making the comparisons, we first draw the common component from a random normal variate with mean 0 and standard deviation 0.54, then draw the random components each from a normal variate with mean 0 and standard deviation 0.83.

[7] We calculated tax liability by determining the individual's adjusted gross income and using data on tax as a share of adjusted gross income from the U.S. Bureau of the Census (1989). To calculate the adjusted gross income, we subtracted estimated welfare, pension, and nontaxable social-security income from total income reported in the survey. Estimated welfare and pension income was based on a regression of total income on demographic characteristics of the individual and reported sources of income—including pension and welfare. The coefficients on the pension and welfare

Our simulation suggested that a small majority of beneficiaries preferred the catastrophic plan; we predict that 56 percent would purchase such a plan at the premium they would face. This preference of course varied depending on income, with a larger majority—65 percent—of beneficiaries in the lowest quintile of the income distribution predicted to purchase and a minority—45 percent—of those in the highest quintile predicted to purchase such coverage.

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indicators in the regression were used as the estimated income from the source for those reporting some income from that source. Nontaxable social-security income for each family was calculated assuming that individuals receive $6300 social-security benefits and married couples $11,000 (these values were based on unpublished data from the U.S. General Accounting Office).

6. CONCLUDING REMARKS

This research estimated a model of AHP plan choice to quantify the effects of changes in plan characteristics on Medicare beneficiaries enrollment decisions. Our results indicated that demand for AHPs is statistically significantly related to changes in price and to changes in the expected value of the benefit package. A 10-percent premium increase results in a 6-percent enrollment decrease; a 10-percent increase in the value of the benefit package results in a 5-percent enrollment increase.

Beneficiaries do value the freedom to choose their primary provider. As hypothesized, the likelihood of enrolling in an AHP decreases as the panel becomes more restricted. Plans that restrict patients to certain hospitals are also significantly less attractive than those that allow patients to use any hospital. In contrast, beneficiaries do not favor plans that allow them to refer themselves to specialists over plans that require the primary care provider to refer the patient.

The model provides a tool that can be used to examine how policy options that affect the financial incentives for beneficiaries to enroll can alter the role that AHPs play in the Medicare market. Our modeling effort used responses about hypothetical options offered to beneficiaries. In drawing conclusions from the model, we assumed that such responses adequately reflect the behavior that would be observed if an actual choice were offered. To the extent that we find similarities between our estimates and observed behavior, this assumption is validated. Our estimates of the price elasticity of demand for insurance benefits are quite similar to estimates of the demand for supplemental benefits based on observed purchase of Medigap policies. Furthermore, our simulations of expected enrollment shares in selected sites with a Medicare competition demonstration compared favorably to actual enrollments in two of three sites. Thus, we believe our model does provide some evidence about the potential role for AHPs in the Medicare market.

In 1989, only 5.9 percent of aged Medicare beneficiaries were enrolled in HMOs and other competitive health plans that contract with Medicare. In contrast, HMOs enroll about 18 percent of individuals covered by private group insurance. Our choice model suggests that Medicare beneficiaries can be attracted to participate in HMOs at a similar rate if offered the opportunity. Simulations of potential enrollment rates reached about 15 percent for HMOs that offer

Medicare beneficiaries a benefit package that was typical of some of the early plans that signed risk contracts with Medicare.

To attract a larger share of beneficiaries to participate, plans must offer substantial financial incentives to encourage Medicare beneficiaries to give up the freedom of provider choice that they enjoy under the traditional Medicare fee-for-service plan. Medicare beneficiaries particularly seem to value benefits that reduce their risk of catastrophic hospital bills and long-term-care costs. Controlling for the value of the additional benefits, plans that offered additional protection against high-cost hospitalization or long-term care were more attractive than plans that offered additional ambulatory benefits. Third in importance in increasing enrollment is a prescription drug benefit. Beneficiaries seem to place less importance on preventive benefits—though this is a key emphasis of many HMOs. This lack of congruence between the HMO emphasis and the types of benefits Medicare beneficiaries most value may be a factor in low Medicare enrollment in AHPs.

Finally, our analysis of factors associated with choice suggest that the favorable selection that has been found in some studies is not a consequence of preferences for AHPs by healthier beneficiaries. In contrast, we found that the predicted likelihood of choosing an AHP was higher among individuals who anticipated high levels of spending in the next year. Moreover, prior utilization did not show the same relationship to enrollment preferences. Yet including prior utilization in determining the AAPCC is often recommended to correct for selection problems. However, if individuals do have information about their future health needs that is not reflected in prior use, this adjustment to the AAPCC may not overcome selection problems. Plans could experience economic losses threatening the sustainability of the Medicare capitation option unless other AAPCC adjustments are found. Research on the nonelderly population has demonstrated that an individual's expectations about future health-care use accurately predict subsequent spending (Marquis and Holmer, 1986). However, whether Medicare beneficiaries have information about their future health care needs that we cannot predict based on observable demographic characteristics and prior spending is a topic for future research. If beneficiaries do have such knowledge about their health needs, HCFA may wish to explore whether incorporating beneficiary self-assessments in setting HMO payment is a feasible or practical way of correcting for selection.

Appendix A

EXAMPLE HYPOTHETICAL PLAN QUESTION

NEW KINDS OF MEDICARE INSURANCE PLANS

As you may know, there are actual proposals in Congress to make changes in Medicare. Other changes may be proposed in the future. To learn what kinds of changes Medicare clients would prefer, we want you to imagine that there is another, new kind of Medicare insurance plan and that you must choose whether you want to keep the same kind of Medicare you have now or change to the new plan.

Answering this questionnaire will not affect your current or future Medicare coverage in any way. This questionnaire is only for research purposes. The new plans that we ask about are not actual plans being considered by Congress.

What we want you to do now is compare Medicare as it is now with several new plans and tell us whether or not you would change from Medicare to each of the new plans. To make it easier we show you what Medicare now provides on the blue card. You can put the card next to each new plan and compare them.

For each of these new plans, we will ask you to tell us whether you would join this new plan or stay with your current Medicare plan by answering YES or NO. Each of the plans has different features. The selections that you and others make between Medicare and the new plans will help us evaluate which features are most important to Medicare clients.

DESCRIPTION OF YOUR CURRENT MEDICARE

SELECTING YOUR HOSPITAL AND DOCTOR		
CHOOSING A HOSPITAL	You can go to any hospital that you and your doctor choose	
CHOOSING A PERSONAL PHYSICIAN	You can go to any doctor you choose	
RECEIVING CARE FROM SPECIALISTS	You can visit any specialist whenever you wish	
JOINING AND LEAVING	Part A: (Hospital coverage) automatically enrolled Part B: (Physician coverage) voluntary enrollment and you can leave anytime	
SERVICES AND BENEFITS		
HOSPITAL CARE	Days 1–60	You pay $540 total
	Days 61–90	You pay $135 a day
	Days 91–150 (reserve days)	You pay $270 a day
	After 150 days	You pay all costs
LONG TERM NURSING (CUSTODIAL CARE)	You pay all costs	
DOCTOR VISITS	You pay the first $75 per year and 20% of approved amounts after that, plus all costs above approved amounts	
PREVENTIVE SERVICES (i.e. checkups and flu shots)	You pay all costs	
PRESCRIPTION DRUGS	You pay all costs	
USING DOCTORS OR HOSPITALS OUTSIDE THE PLAN	Not applicable for Medicare	
PREMIUM	You pay $24.80 per month for Part B	

It may help you in your evaluation of these plans to record the amount you pay for any extra health insurance here.

$ ____________

DESCRIPTION OF NEW MEDICARE PLAN #1

SELECTING YOUR HOSPITAL AND DOCTOR

CHOOSING A HOSPITAL	You can only go to hospitals associated with the plan
CHOOSING A PERSONAL PHYSICIAN	You can visit doctors at the plan facilities. About 10% of doctors in your area belong to the plan. Your usual doctor **IS** a member of the plan.
RECEIVING CARE FROM SPECIALISTS	You can visit a specialist who belongs to the plan only when you personal physician refers you
JOINING AND LEAVING	You can leave the plan with 30 days notice

SERVICES AND BENEFITS

HOSPITAL CARE	Days 1–60	You pay $100 total
	Days 61–90	You pay $135 a day
	Days 91–150 (reserve days)	You pay $270 a day
	After 150 days	You pay all costs
LONG TERM NURSING HOME (CUSTODIAL CARE)	You pay $25 per day	
DOCTOR VISITS	You pay the first $75 per year and $5 per visit after that	
PREVENTIVE SERVICES (i.e. checkups and flu shots)	You pay all costs	
PRESCRIPTION DRUGS	You pay nothing	
USING DOCTORS OR HOSPITALS OUTSIDE THE PLAN	You pay 50% of the first $1000 charges per year, and all costs after that	

PREMIUM	You total cost is **$43.80** per month. You pay $24.80 per month to Medicare, plus $19.00 **extra** per month to the plan.

Would you join this plan instead of your current Medicare?

YES........1

NO........2

Appendix B

REGRESSIONS FOR RESPONSE ANALYSIS

This appendix includes the probit regressions to describe factors related to nonresponse. Table B.1 gives the results for form nonresponse and B.2 the results for the regression to explain whether responses were obtained about most (eight of nine) plans among beneficiaries returning the form. In both tables, the last column uses the coefficient estimate to show the change in the probability of response for a one unit change in the explanatory variable. For example, in the last column of the row labeled "Age 67–69" in Table B.1, the -0.081 entry indicates that the probability of returning a completed questionnaire is 8.1 percentage points lower among persons age 67–69 than among the reference group (age 65–66). The t-statistic of greater than 2.0 (in absolute value) indicates that this difference is statistically significant.

In Table B.2, the last column for the row labeled "Age 67–69" shows that beneficiaries in this age group who return the form are also somewhat less likely than beneficiaries age 65–66 to respond about most of the plan options. The probability of answering eight of nine options is 5.5 percentage points lower among the beneficiaries age 67–69 than among beneficiaries age 65–66.

Table B.1

Probit Regression for Form Response

Variable	Parameter Estimate	Standard Error	t-statistic	Change in Probability of Response
Intercept	0.323	0.099	3.28	—
Age				
67–69	–0.213	0.097	–2.19	–0.081
70–74	–0.233	0.095	–2.46	–0.088
75–79	–0.264	0.092	–2.86	–0.100
≥ 80	–0.494	0.077	–6.38	–0.187
AHP Medicare				
Market share				
Medium	–0.076	0.069	–1.10	–0.029
Low	–0.068	0.079	–0.87	–0.026
Medicaid	–0.296	0.071	–4.19	–0.112
Phone stratum	–0.553	0.081	–6.85	–0.210
Ever in medicare				
HMO	–0.027	0.192	–0.14	–0.010
Residence				
Northeast	–0.073	0.075	–0.98	–0.028
Midwest	–0.058	0.075	–0.77	–0.022
West	0.137	0.094	1.45	0.052
1987 Medicare spending				
Inpatient	–0.009	0.006	–1.66	–0.003
Outpatient	0.017	0.021	0.79	0.006

NOTE: Inpatient and outpatient dollars are measured in thousands. The omitted characteristics are: age 65–66, in areas of low AHP Medicare market share, not under Medicaid buy-in, no-phone stratum, never enrolled in an HMO under Medicare, reside in the South. The change in probability is calculated relative to a beneficiary in the reference group defined by the value of the omitted characteristics; the predicted response rate for the reference individual is 62.6 percent.

Table B.2

Probit Regression for Whether Answered at Least Eight Hypothetical Options

Variable	Parameter Estimate	Standard Error	t-statistic	Change in Probability of Response
Intercept	1.289	0.165	7.81	—
Age				
67–69	-0.331	0.167	-1.97	-0.055
70–74	-0.586	0.160	-3.66	-0.098
75–79	-0.642	0.157	-4.09	-0.107
≥ 80	-0.608	0.143	-4.26	-0.102
AHP Medicare				
Market share				
Medium	0.025	0.114	0.22	0.004
Low	-0.105	0.131	-0.80	-0.018
Medicaid	-0.222	0.118	-1.89	-0.037
Phone stratum	-0.268	0.150	-1.79	-0.045
Ever in medicare				
HMO	0.208	0.323	0.64	0.035
Residence				
Northeast	-0.192	0.125	-1.54	-0.032
Midwest	-0.063	0.123	-0.51	-0.010
West	0.141	0.158	0.89	0.024
1987 Medicare spending				
Inpatient	0.008	0.008	1.03	0.001
Outpatient	0.031	0.037	0.84	0.005

NOTE: Inpatient and outpatient dollars are measured in thousands. The omitted characteristics are: age 65–66, in areas of low AHP Medicare market share, not under Medicaid buy-in, no-phone stratum, never enrolled in an HMO under Medicare, reside in the South. The change in probability is calculated relative to a beneficiary in the reference group defined by the value of the omitted characteristics; the predicted response rate for the reference individual is 90.7 percent.

Appendix C

REGRESSIONS FOR IMPUTATION OF ANTICIPATED EXPENDITURES

Table C.1

Probit Regression for Anticipation of Use of Medicare Covered Services

Variable	Parameter Estimate	Standard Error	t-statistic
Intercept	0.1999	0.5659	0.35
Log income	0.4656	0.2197	2.12
Log Medigap premium	0.0134	0.0307	0.44
Black	0.0971	0.0465	2.09
Married	0.0591	0.0154	3.83
Male	0.2790	0.1666	1.67
Phone stratum	0.1858	0.1032	1.80
1987 Medicare expenditures			
Had expenditures	−0.1075	0.0994	−1.08
Log spending if positive	0.0727	0.1369	0.53
Medicaid	−0.2458	0.1215	−2.02
Health outlook scales	−0.3893	0.0595	−6.54
Physical limitations	0.3253	0.1669	1.95
Age			
67–69	−0.5198	0.1566	−3.32
70–74	−0.5929	0.1617	−3.67
75–79	−0.5779	0.1615	−3.58
≥ 80	−0.7850	0.1541	−5.09

Table C.2

Probit Regression for Anticipation of Inpatient Stay If Anticipate Some Use of Covered Services

Variable	Parameter Estimate	Standard Error	t-statistic
Intercept	1.6715	0.6822	2.45
Log income	−0.7848	0.2538	−3.09
Log Medigap premium	0.1158	0.0331	3.50
Black	−0.1382	0.0566	−2.44
Married	−0.0048	0.0186	−0.26
Male	−0.0223	0.1746	−0.13
Phone stratum	0.0666	0.1160	0.58
1987 Medicare expenditures			
Had expenditures	0.2959	0.1111	2.66
Log spending if positive	−0.0747	0.1613	−0.46
Medicaid	0.2247	0.1367	1.64
Health outlook scales	−0.3751	0.0692	−5.42
Physical limitations	−0.0348	0.1893	0.18
Age			
67–69	0.0906	0.1709	0.53
70–74	0.2341	0.1702	1.38
75–79	0.0838	0.1763	0.48
≥ 80	0.2311	0.1729	1.34

Table C.3

Regression for Logarithm of Expected Physician Expenditures If Anticipate Only Ambulatory Use

Variable	Parameter Estimate	Standard Error	t-statistic
Intercept	5.3433	0.8054	6.634
Log income	0.0046	0.0701	0.066
Log Medigap premium	–0.0155	0.0197	–0.790
Black	–0.0259	0.2000	–0.130
Married	0.0188	0.1247	0.151
Male	–0.0682	0.1199	–0.569
Phone stratum	0.0747	0.1580	0.473
1987 Medicare expenditures			
Had expenditures	–0.0252	0.2422	–0.104
Log spending if positive	0.0881	0.0337	2.611
Medicaid	–0.2832	0.1617	–1.751
Health outlook scales	–0.1522	0.0747	–2.036
Physical limitations	0.1501	0.2076	0.723
Age			
67–69	–0.1124	0.1663	–0.676
70–74	–0.0932	0.1766	–0.528
75–79	–0.2342	0.1786	–1.311
≥ 80	–0.3742	0.1842	–2.031

Table C.4

Regression for Logarithm of Expected Physician Expenditures If Anticipate Inpatient Stay

Variable	Parameter Estimate	Standard Error	t-statistic
Intercept	5.3807	1.0889	4.941
Log income	0.1855	0.0831	2.231
Log Medigap premium	0.0335	0.0333	1.007
Black	0.2734	0.3383	0.808
Married	−0.1726	0.2136	−0.808
Male	0.0436	0.2039	0.214
Phone stratum	0.2960	0.3296	0.898
1987 Medicare expenditures			
Had expenditures	−1.1334	0.4947	−2.291
Log spending if positive	0.1599	0.0620	2.575
Medicaid	−0.0485	0.2465	−0.197
Health outlook scales	−0.3014	0.1215	−2.481
Physical limitations	0.0983	0.3399	0.289
Age			
67–69	0.2652	0.3592	0.739
70–74	−0.0564	0.3566	−0.158
75–79	0.4694	0.3640	1.290
≥ 80	0.2251	0.3425	0.657

Table C.5

Regression for Logarithm of Expected Hospital Expenditures If Anticipate Inpatient Stay

Variable	Parameter Estimate	Standard Error	t-statistic
Intercept	6.0613	0.7105	8.530
Log income	0.0589	0.0542	1.086
Log Medigap premium	0.0205	0.0217	0.944
Black	-0.4194	0.2207	-1.900
Married	-0.1202	0.1394	-0.863
Male	-0.0114	0.1330	-0.086
Phone stratum	0.1805	0.2151	0.839
1987 Medicare expenditures			
Had expenditures	-0.4365	0.3228	-1.352
Log spending if positive	0.0759	0.0405	1.874
Medicaid	0.1319	0.1608	0.820
Health outlook scales	-0.1176	0.0793	-1.483
Physical limitations	0.2766	0.2218	1.247
Age			
67–69	0.4592	0.2343	1.959
70–74	0.1621	0.2327	0.697
75–79	0.4206	0.2375	1.771
≥ 80	0.1359	0.2235	0.608

Table C.6

Regression for Logarithm of Expected Prescription Drug Expenditures

Variable	Parameter Estimate	Standard Error	t-statistic
Intercept	2.6817	0.8069	3.323
Log income	0.1724	0.0676	2.551
Log Medigap premium	0.0471	0.0221	2.128
Black	0.0066	0.2296	0.029
Married	0.0580	0.1435	0.404
Male	−0.0059	0.1368	−0.043
Phone stratum	0.1245	0.1909	0.652
1987 Medicare expenditures			
Had expenditures	0.3260	0.2941	1.109
Log spending if positive	0.1263	0.0406	3.108
Medicaid	−0.2774	0.1709	−1.623
Health outlook scales	−0.5786	0.0803	−7.198
Physical limitations	0.7541	0.2316	3.255
Age			
67–69	−0.1825	0.2062	−0.885
70–74	−0.8296	0.2133	−3.888
75–79	−0.4242	0.2141	−1.982
≥ 80	−0.6796	0.2082	−3.264

NOTE: Dependent variable is Log (expected expenditures +1).

Table C.7

Regression for Logarithm of Expected Preventive Expenditures

Variable	Parameter Estimate	Standard Error	t-statistic
Intercept	2.5561	0.8137	3.141
Log income	0.1568	0.0681	2.300
Log Medigap premium	0.0442	0.0223	1.980
Black	–0.1668	0.2315	–0.721
Married	0.1635	0.1447	1.130
Male	0.0812	0.1380	0.588
Phone stratum	0.2562	0.1924	1.331
1987 Medicare expenditures			
Had expenditures	0.6540	0.2966	2.205
Log spending if positive	0.0626	0.0409	1.529
Medicaid	–0.3143	0.1724	–1.823
Health outlook scales	–0.3072	0.0810	–3.790
Physical limitations	–0.0787	0.2336	–0.337
Age			
67–69	–0.4818	0.2079	–2.317
70–74	–0.6163	0.2151	–2.864
75–79	–0.5399	0.2158	–2.501
≥ 80	–0.7916	0.2099	–3.770

NOTE: Dependent variable is Log (expected expenditures +1).

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